

DAILY MAGNETOGRAMS FOR 1981 FROM THE AFGL (AIR FORCE  
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AFGL-TR-85-0030

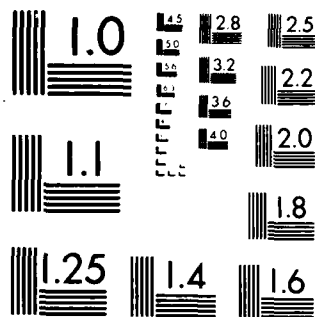
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AFGL-TR-85-0030  
SPECIAL REPORTS, NO. 246

# Daily Magnetograms for 1981 From the AFGL Network

DAVID J. KNECHT

28 February 1985

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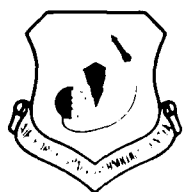
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SPACE PHYSICS DIVISION

PROJECT 7601

**AIR FORCE GEOPHYSICS LABORATORY**

HANSCOM AFB, MA 01731

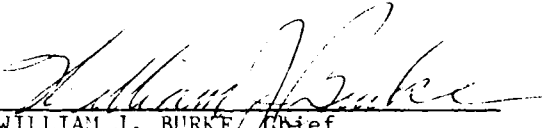


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"This technical report has been reviewed and is approved for publication"

FOR THE COMMANDER

  
WILLIAM J. BURKE, Chief  
Space Plasmas and Fields Branch

  
RITA C. SAGALYN, Director  
Space Physics Division

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<p>A stacked plot of 24-hour magnetograms from the AFGL Magnetometer Network is presented for each UT day of the year 1981. Each plot, on a single page, contains all 21 traces from the fluxgate magnetometers of the network (three components at seven stations). The data plotted are 2-min averages of the 1-min edited data set that has been provided to the World Data Center. To aid in comparisons between days, the magnetograms are plotted with a fixed amplitude scale that preserves a resolution of one or two nanoteslas. For the days that are more active, the plots have been repeated at a reduced amplitude. These magnetograms serve to assess the general character of magnetic activity, identify events for scientific study, and indicate the coverage and quality of the data available from the World Data Center.</p>				
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## Preface

This volume of magnetograms from the AFGL Magnetometer Network is the fourth in a set of six yearly volumes covering the years 1978 through 1983. Descriptive material needed to explain the magnetograms is repeated so each volume can be used independently.

These volumes are dedicated to the memory of Robert W. Crowe, who, as a high-school student, carried out much of the computer work that produced the edited data shown in these plots and who lost his life in October 1982 while the work was under way.

Many other persons have also contributed greatly to this effort. The project, which required reading more than 1200 input data tapes, writing more than 4500 edited-data tapes, and making and assembling more than 6500 separate plots for these volumes, was made possible by the dedicated efforts of a group of college and high-school students. Armand Paboojian supervised and personally undertook much of the production of the edited data base. Ric Laperriere, Stephen Morris, Catherine Whittaker, Glenn Ellis, and Ara Topjian also contributed many hours to this work. Fr. John F. Devane, S.J., directed the contractual effort of Boston College under which most of the students work. Ric Laperriere carried out a large fraction of the production runs that produced the final plots. These generous contributions are gratefully acknowledged.

## Contents

1. INTRODUCTION	1
2. DESCRIPTION OF THE NETWORK	2
3. EDITING OF THE DATA	3
4. DESCRIPTION OF THE PLOTS	4
5. METHOD OF PRODUCING THE PLOTS	5
6. CAUTIONS ABOUT USE OF THE PLOTS	6
7. BASIC PLOTS AT STANDARD AMPLITUDE	7
8. SUPPLEMENTARY PLOTS AT REDUCED AMPLITUDE	373

## Illustrations

1. Map of the AFGIL Magnetometer Network	2
365 Daily Magnetograms at Standard Amplitude	8-372
44 Daily Magnetograms at Reduced Amplitude	374-417

## Tables

1. Locations of the Data-Collection Stations	3
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## Daily Magnetograms for 1981 From the AFGL Network

### 1. INTRODUCTION

From mid-1976 through 1983, the AFGL Magnetometer Network made continuous measurements of the surface magnetic field at seven stations spanning the contiguous United States. An edited data base has been produced for the period 1978-1983; it consists of three-component measurements of the field at the seven network stations by fluxgate magnetometers sampled once per second. A subset of these data, consisting of 1-min average values in the standard IMS format, is available to the scientific community through the World Data Center.

This report, one of a series of yearly volumes, presents the 1-min subset of data for the year 1981 in the form of stacked daily magnetograms, one day per page. The anticipated uses of these plots include: (1) discovering the overall pattern of magnetic activity across the United States for any day, (2) identifying events for scientific study, and (3) indicating the coverage and quality of the data available from the World Data Center.

For the basic set of 365 daily plots, the question of amplitude scale was resolved in favor of a constant value for all plots to facilitate comparison when scanning over many pages. However, for about 10 percent of all days this choice causes traces to be offscale or confused, so for these days the plot is repeated on a less sensitive scale in a subsequent section of supplemental plots.

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(Received for publication 25 February 1985)

## 2. DESCRIPTION OF THE NETWORK

The AFGL Magnetometer Network consisted of seven remote instrumented stations at the locations shown in Figure 1 and listed in Table 1. The five northern stations form a line at approximately 55 degrees cgm latitude, while the two southern stations are both at about 40 degrees cgm latitude.

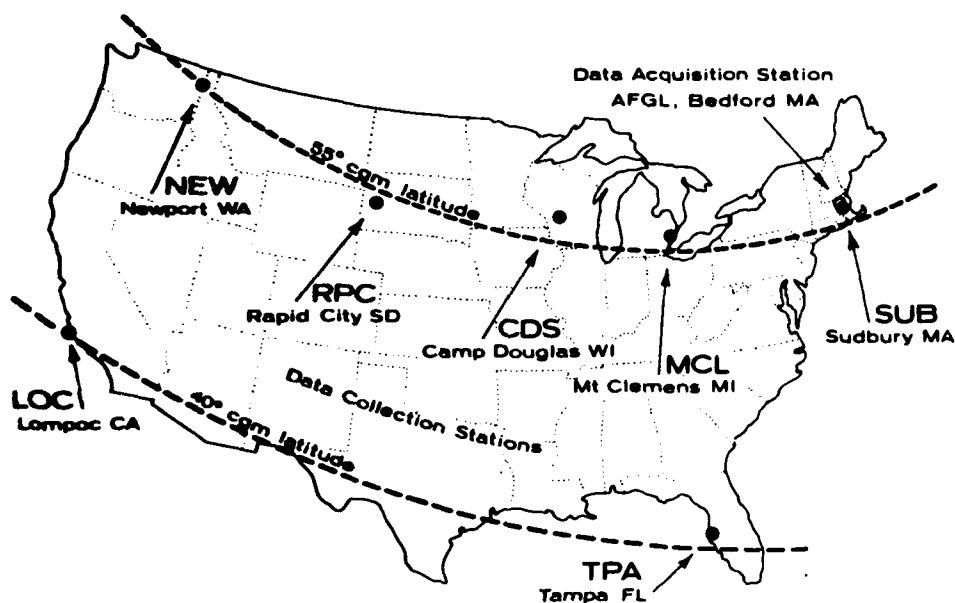


Figure 1. Map of the AFGL Magnetometer Network

The instrumentation at all sites was essentially identical. The instrument which made the measurements presented here is a three-component fluxgate magnetometer built by the University of California at Los Angeles. (Data from a second instrument, an induction-coil magnetometer, is not discussed). The fluxgate magnetometer has a basic analog (fine-scale) range of  $\pm 64$  nanoteslas; it is kept onscale by applying to the sensor a precise (coarse-scale) nulling field of an integral multiple of 64 nT to cover the full range of approximately  $\pm 65,000$  to  $\pm 65,000$  nT. The fine-scale output is digitized by an 11-bit analog-to-digital converter, with the least significant bit representing  $1/16$  nT. The instrument was sampled once per second.

Data from all stations were returned to a data-acquisition station at AFGL via a single dedicated voice-grade circuit made up largely of ordinary phone lines and

having a branch to each of the stations. A polling signal sent from the data-acquisition station synchronized all stations to within several milliseconds accuracy by incorporating compensation for propagation delays. Data collected at each station during any 10-sec sampling interval were transmitted in a block at some point during the next interval. A forward-error-correcting scheme was used to eliminate transmission errors. Data were received, compressed, formatted, and archived on magnetic tape by a dedicated minicomputer. Subsequently, several series of edited-data tapes were produced from the archive tapes, using the same minicomputer, as described in the following section.

Table 1. Locations of the Data-Collection Stations

Station Symbol and Name (post office)	Corrected Geomagnetic Coordinates		Geographic Coordinates		Government Installation
	N Lat	E Long	N Lat	E Long	
NEW Newport WA	55.2	299.6	48.3	117.1	USGS Newport Observatory
RPC Rapid City SD	54.1	317.3	44.2	103.1	Ellsworth Air Force Base
CDS Camp Douglas WI	56.3	334.2	44.0	90.3	Volk Field (Natl. Guard Base)
MCL Mount Clemens MI	55.8	344.8	42.6	82.9	Selfridge Air Natl. Guard Base
SUB Sudbury MA	55.8	1.9	42.2	71.3	Army Natick Laboratory Annex
LOC Lompoc CA	40.2	300.6	34.7	120.6	Vandenberg Air Force Base
TPA Tampa FL	40.7	344.9	27.8	82.5	MacDill Air Force Base

### 3. EDITING OF THE DATA

The content of the archive data tapes is the series of successive data transmissions, recorded with minimal processing at the time of reception. These raw tapes are somewhat inconvenient for general use, since they reflect network malfunctions of many kinds, include other scientific and housekeeping data, and use a complex format for economy. An edited version, containing only the fluxgate measurements, was desired, and an automated procedure for processing these tapes was developed.

The editing process was designed to correct for a number of errors likely (and often known) to occur in the data because of various equipment malfunctions. The basis for detecting and assessing the errors was a set of redundancy and consistency checks built into or inherent in the data. The faults corrected (in most cases by

discarding the faulty data) included: (1) magnetometer outputs differing from a nominal quiet-time value by more than 2048 nT, (2) transmissions not confirmed to have come from the correct station, and (3) incorrect time values associated with transmissions. At the same time, the data were organized by time interval, station, and component, with missing data filled with blanks.

It may be noted that the faults addressed in editing are almost exclusively those of the collection and transmission system; the only criterion placed on the magnetometer output was that it be reasonably close to an expected value. One reason for this is that rigorous criteria for assessing the correctness of the magnetometer data are so lacking that an automated procedure is not possible. But another reason is that, for many purposes, the usefulness of the data is only slightly (or not at all) diminished by the most common malfunctions. Therefore, most failures experienced with the magnetometers are still reflected in the edited data. Since the stations were unattended, a number of days often elapsed before a malfunction was corrected, and caution is necessary in using these data. Some specific guidance is provided in Section 6 below.

#### 4. DESCRIPTION OF THE PLOTS

The basic set of plots is presented in Section 7. It includes, for each day in the year, daily magnetograms for all three components of the seven network stations, a total of 21 traces. These are grouped into three panels by component, in the order X, Y, Z from top to bottom of the page, where X is magnetic north, Y is magnetic east, and Z is vertically downward. This alignment was only approximate, and during the early years X and Y were often rotated slightly about Z to keep the Y component slightly positive. To facilitate comparisons between adjacent stations, the traces within each panel are further ordered by plotting the 55-degree stations first, west to east, followed by the two 40-degree stations, west to east.

For the basic set of plots a common fixed amplitude scale was selected for ease in comparing between days. The value of 40 nT per major division was chosen because it kept about 90 percent of the plots onscale. A major division is the distance between the dotted baselines for adjacent traces. One minor division represents 10 nT, and a resolution of about one or two nT is preserved in the traces. For active days on which the traces go offscale or become confused by overlap, a supplementary set of plots, using a scale of 160 or 400 nT per major division is presented in Section 8. A small solid triangle following the date on the basic plot in Section 7 indicates that a supplementary plot has been provided.

Each trace is labeled at the left with a three-letter station code. Its absolute calibration is provided by the corresponding value (in nT) of the horizontal dotted

baseline. This value, appearing just below the station code, is the 24-hour mean of the data plotted, rounded to the nearest nanotesla. The station code and baseline value are omitted whenever all data points in a trace are blanks or, very rarely, when a badly malfunctioning trace has been eliminated to avoid obscuring good traces. The presence of the label usually (but not reliably) indicates that the trace is not completely blank.

The time scale covers the 24-hour UT day, with 1-hr and 10-min subdivisions. The edited data base consists of one value per minute (good datum or blank) for each of the 21 traces, but since this sampling rate exceeds the resolution possible on the page, 2-min averages were plotted instead. This results in 720 points per day, and since the full-scale length of the time axis is roughly 144 mm, the point-to-point spacing is about 0.2 mm (0.008 in. ).

The date is printed at the lower left corner of each plot, first in the form day-of-month, month, year. It is repeated, in parentheses, in the form year (followed by a period) and day-of-year. As noted above, a solid triangle after the final parenthesis indicates the presence of a supplementary plot in Section 8.

## 5. METHOD OF PRODUCING THE PLOTS

The plots were generated by the network minicomputer (Varian model V72, vintage 1972) with 7-track tape units to read input data. The automated plot program was written in FORTRAN and incorporated Varian Dataplot software. The output device was a Tektronix type 4014 terminal equipped with a type 4631 hardcopy unit. With this equipment the plot is first drawn by an electron beam on the screen of the CRT (a storage device) and then copied to the hardcopy unit by a second beam which scans the screen; a third beam in the hardcopy unit writes the plot onto a dry-silver heat-developed paper. The three panels for each day of data were produced separately and then trimmed and taped together by hand, using overlapping registration marks for alignment. Since the image on the dry-silver paper deteriorates rapidly, the assembled plots were then copied, with a reduction to 74 percent or original size, on an IBM series III model 20 photocopier. These copies were furnished for the printer to use without further reduction.

The linearity and accuracy afforded by this method is sufficient for most purposes but does not equal that achievable by producing all three panels at once on a good electrostatic plotter and photoreducing the plots in the printshop. Some care may therefore be necessary in attempting precise measurements from these plots.



## 6. CAUTIONS ABOUT USE OF THE PLOTS

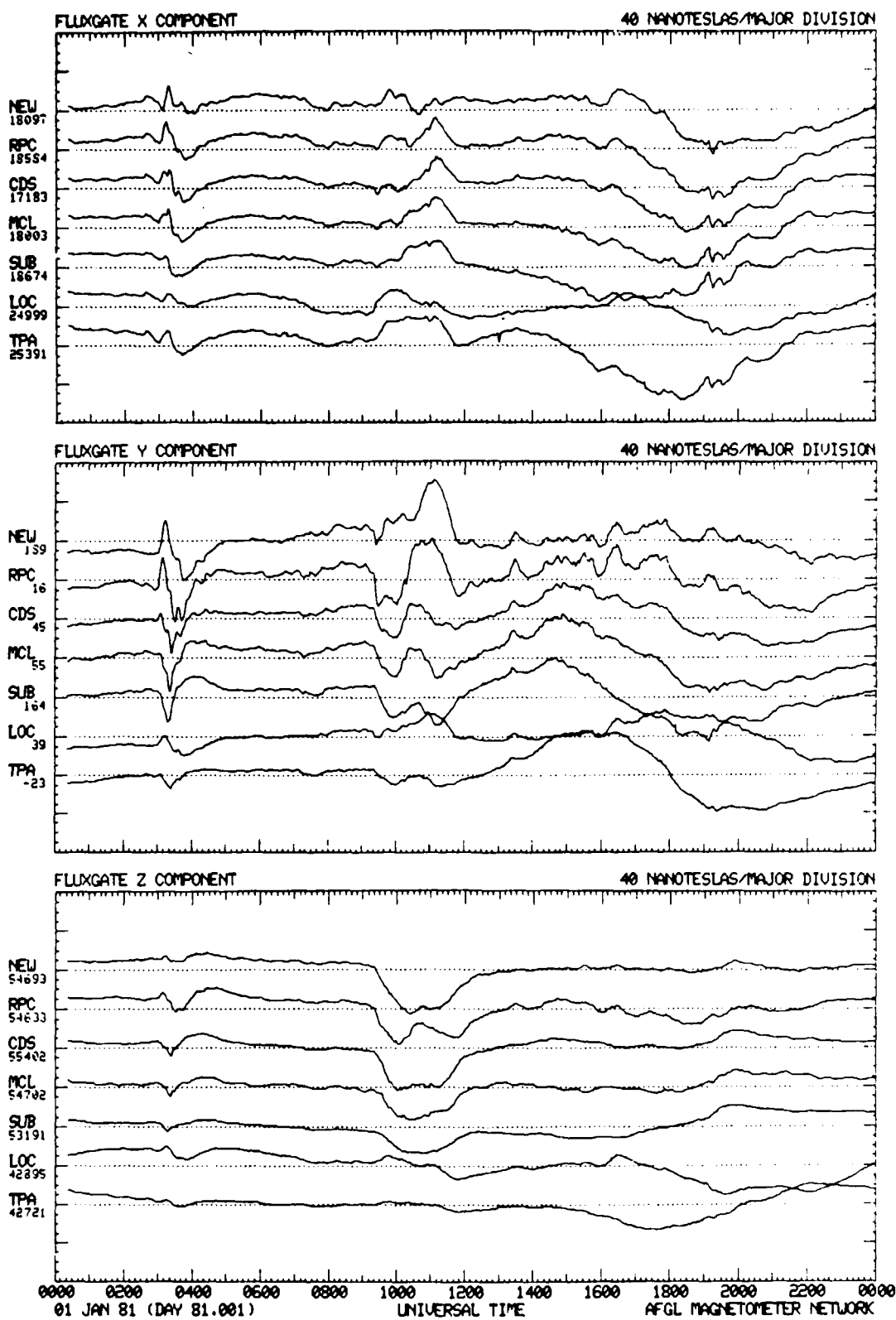
The following brief comment on some common faults in the data may be useful. Examples are given by a reference in parentheses to a plot which exhibits the particular fault described.

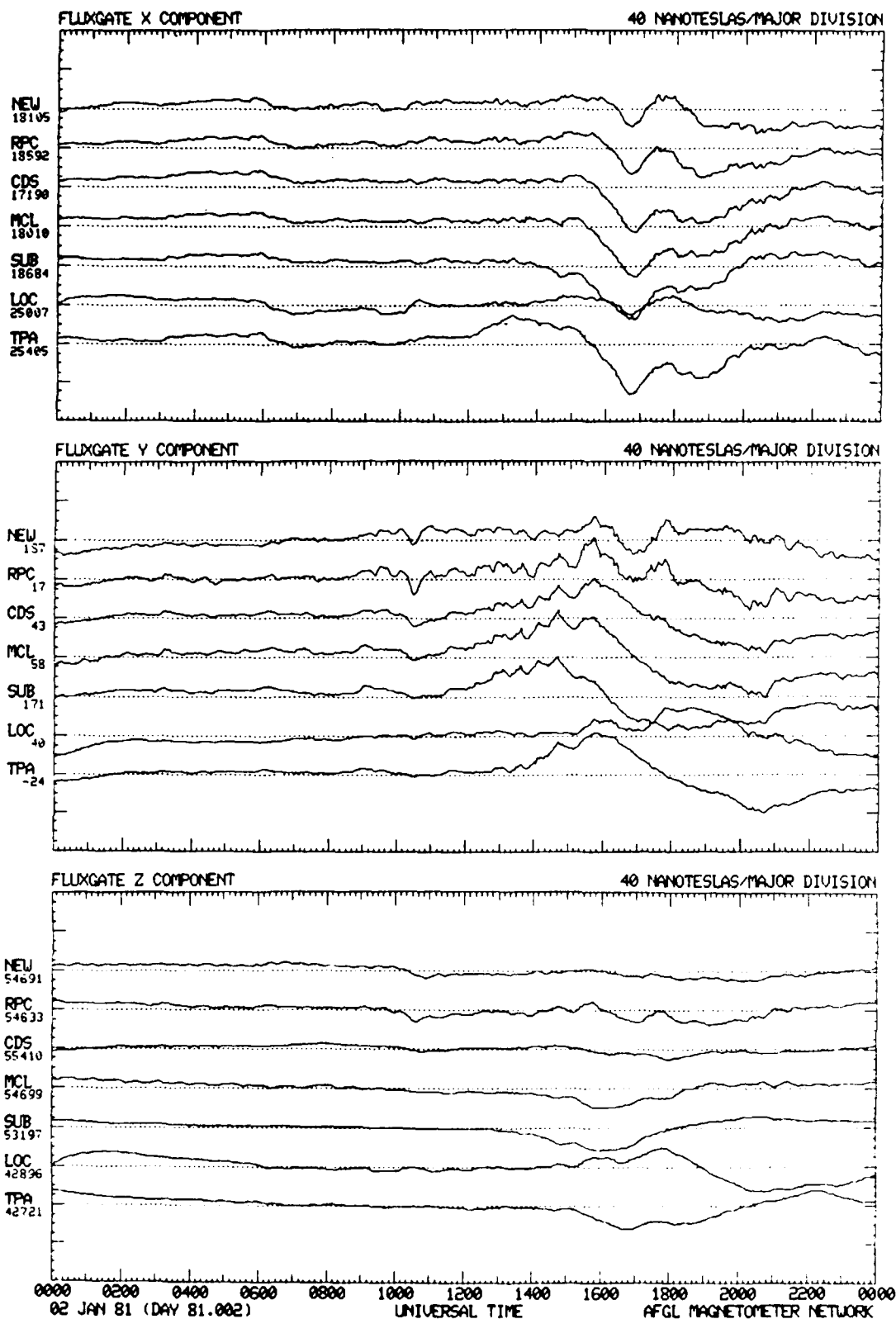
Two problems were caused by the plotting equipment: (1) Some trace labels are occasionally shifted into the middle of a panel, to the right of their proper location (09 and 23 April). This problem was ignored because it was not easy to cure and caused no serious harm. (2) The least significant digit of the baseline value for a trace is occasionally omitted (CDS-X and SUB-Z traces, 03 January). Since baseline values are all right-justified, the absence of the final digit can be seen, but the value will be uncertain by 5 nT. Again, the harm caused was not enough to justify the cost of solving it.

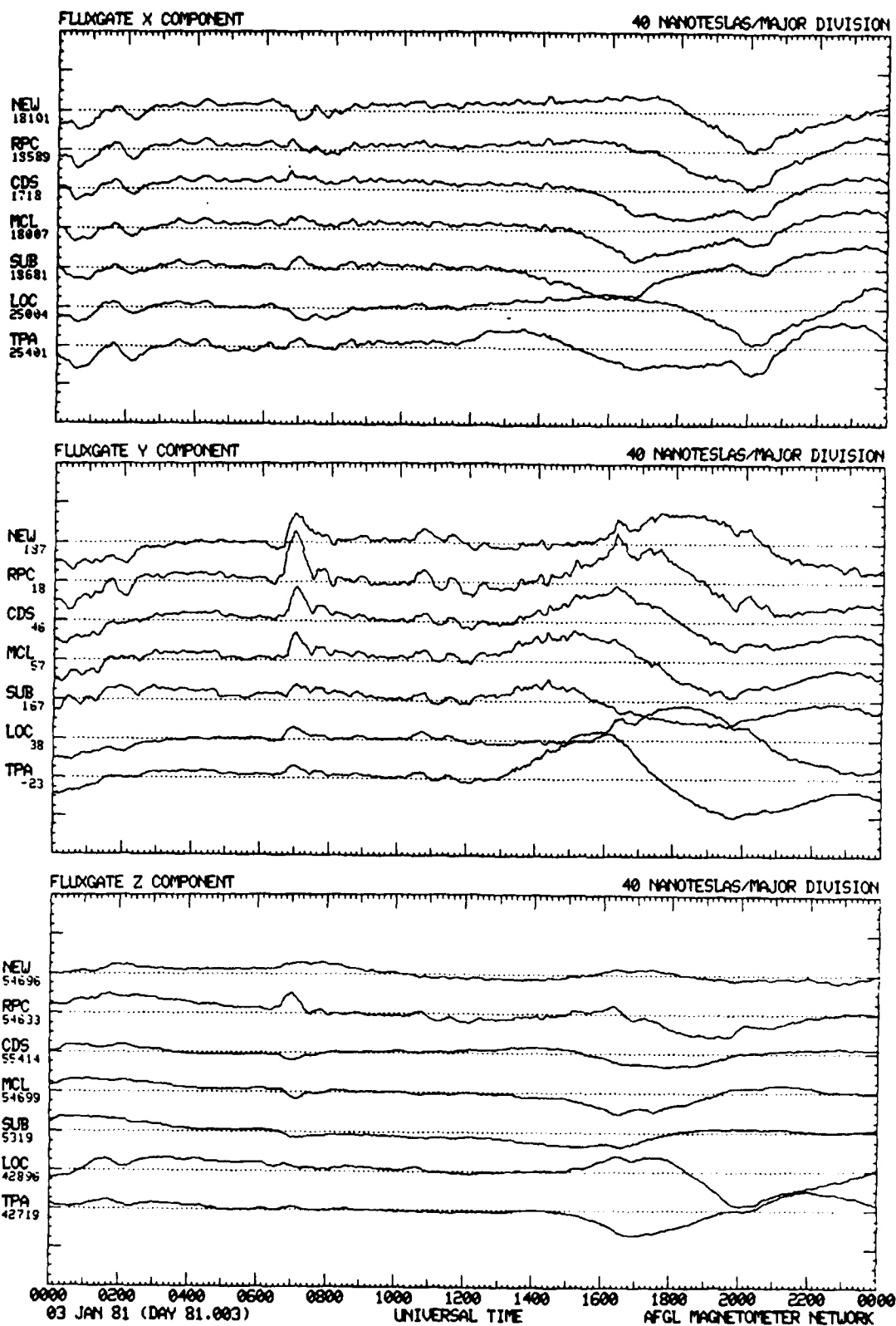
As noted earlier, data from malfunctioning magnetometers were not excluded unless they differed greatly from expected values. Usually the integrity of the data can be adequately assessed by comparing any trace with those of adjacent stations and by observing its behavior over an extended interval. Five common malfunctions are these: (1) An instrument which does not change range properly may exhibit sudden positive or negative jumps of 64 nT, the amount of one coarse-scale step (no good example in 1981, but note the MCL-Z trace, 21 August). (2) Some failures, such as a data-system bit that fails to turn on or off, cause smaller jumps (note the jumps of about 32 nT in the SUB-Z trace, 18 March). (3) Some failures cause a trace to exhibit noise, which may be large (NEW traces, 06 and 07 May) or small (NEW-Z trace, 01 September). (4) Failure of the fine-scale output causes a trace to show no activity except an occasional range-change jump of 64 nT (LOC traces, 08-13 June). (5) Failure of the temperature-compensating circuitry makes the output very dependent on electronics temperature; the trace will then reflect the regular cycles of the thermostatically controlled trailer temperature (MCL-Z trace, 21 and 27 January). (6) Other severe malfunctions can cause wild drifting (SUB-Y trace, 20, 23, and 24 March), large noise spikes (RPC-X trace, 02 March), or bursts (NEW-Z trace, 22 January). All these faults can normally be detected in the context of the stacked plots.

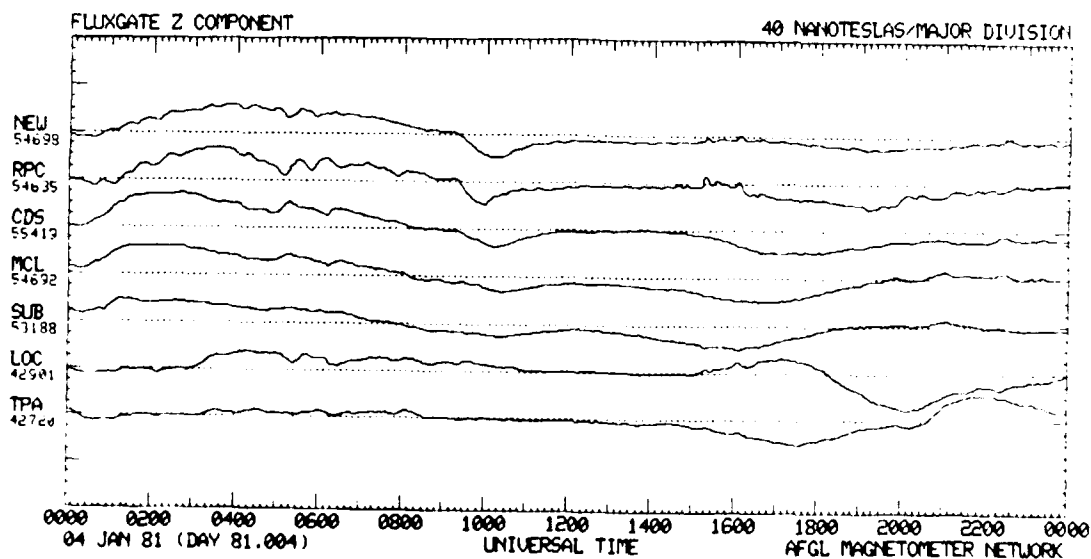
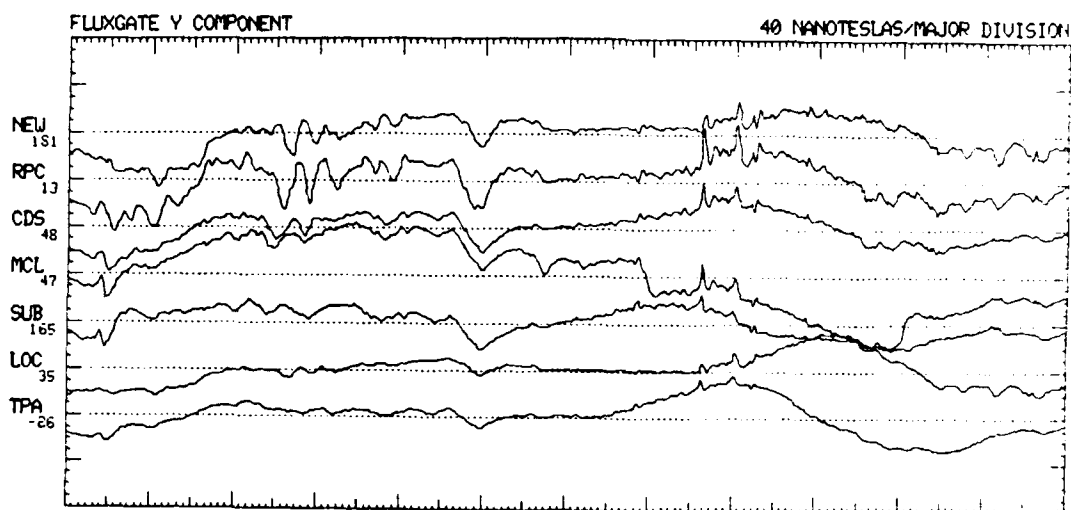
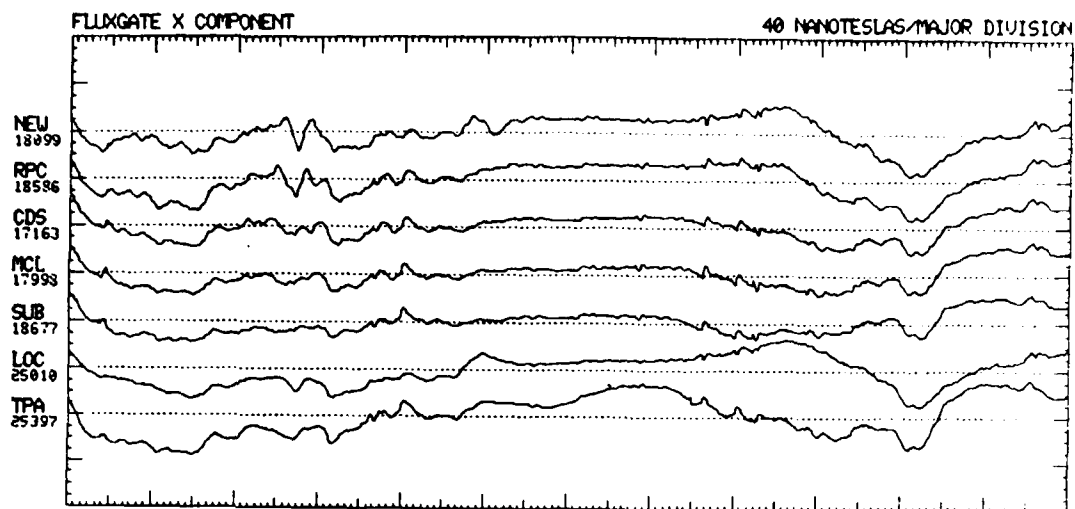
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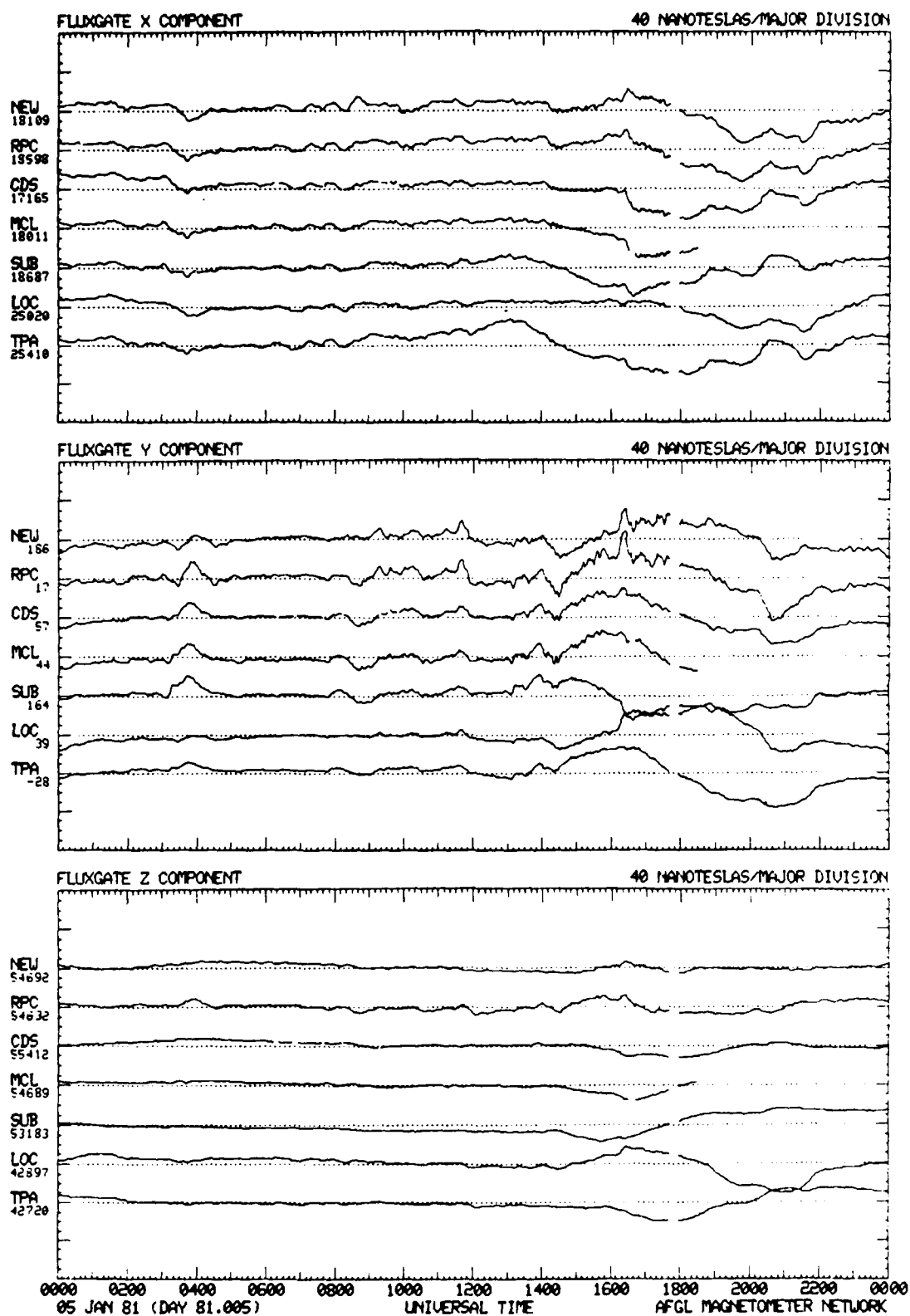
This section presents one stacked-magnetogram plot for each day of 1981, using the standard amplitude scale of 40 nT per major division.

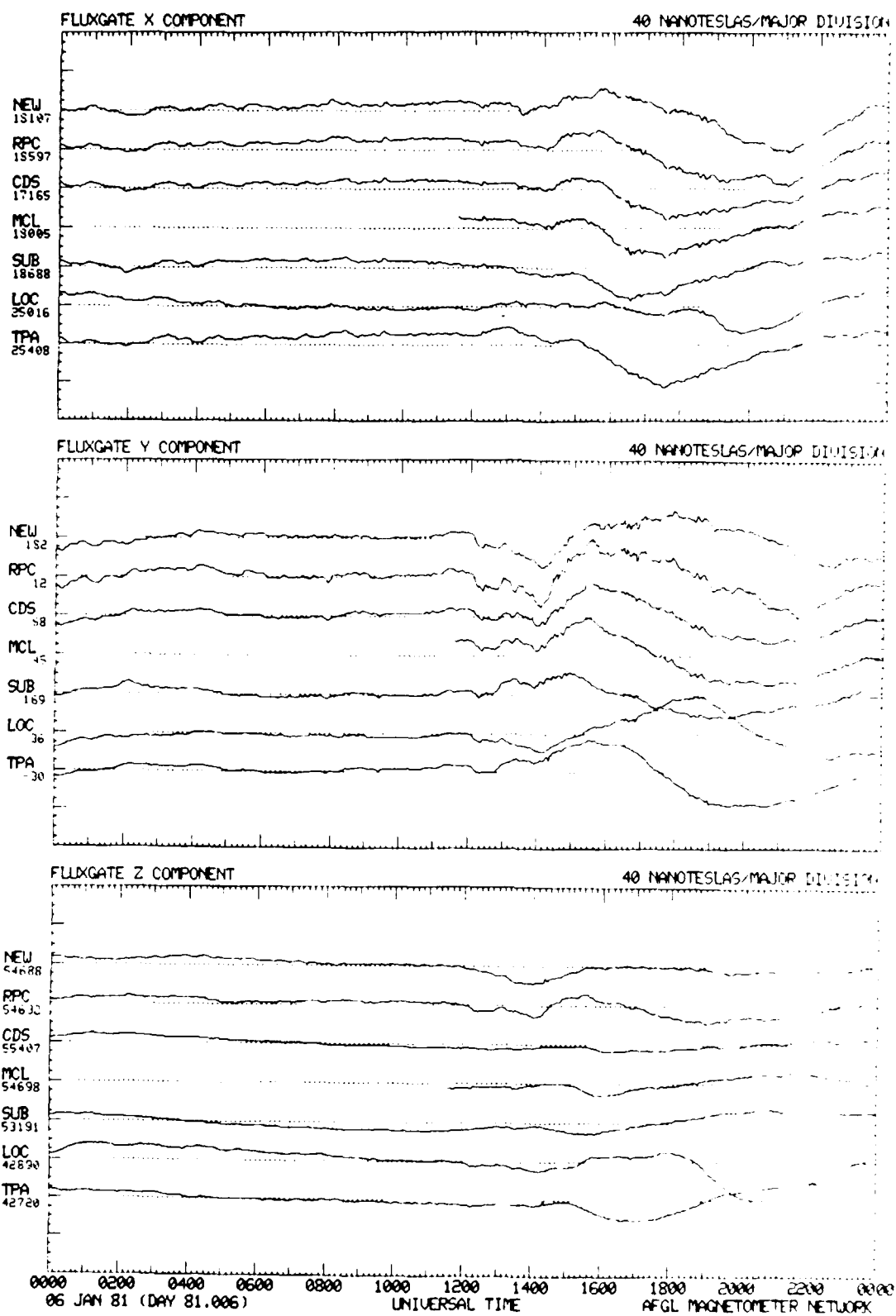




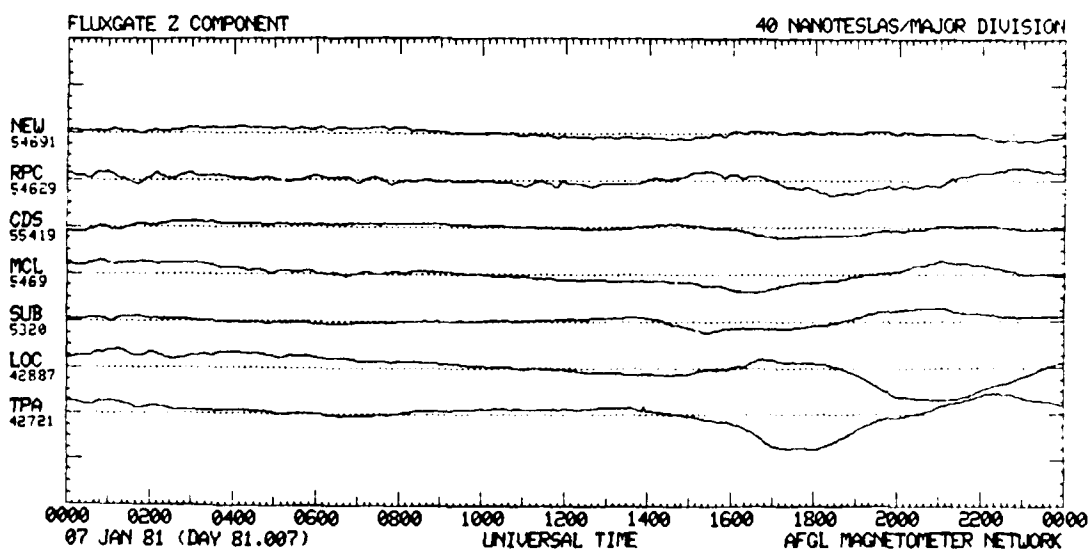
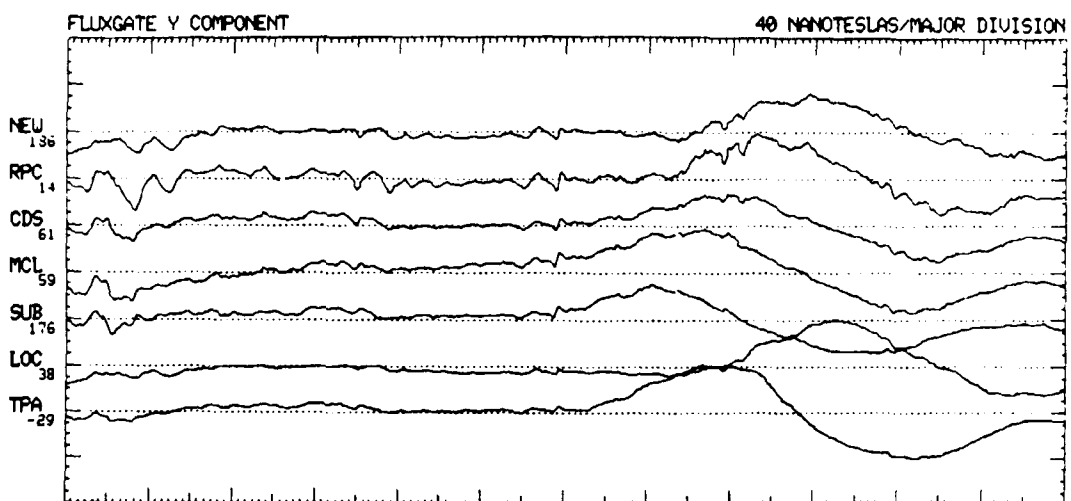
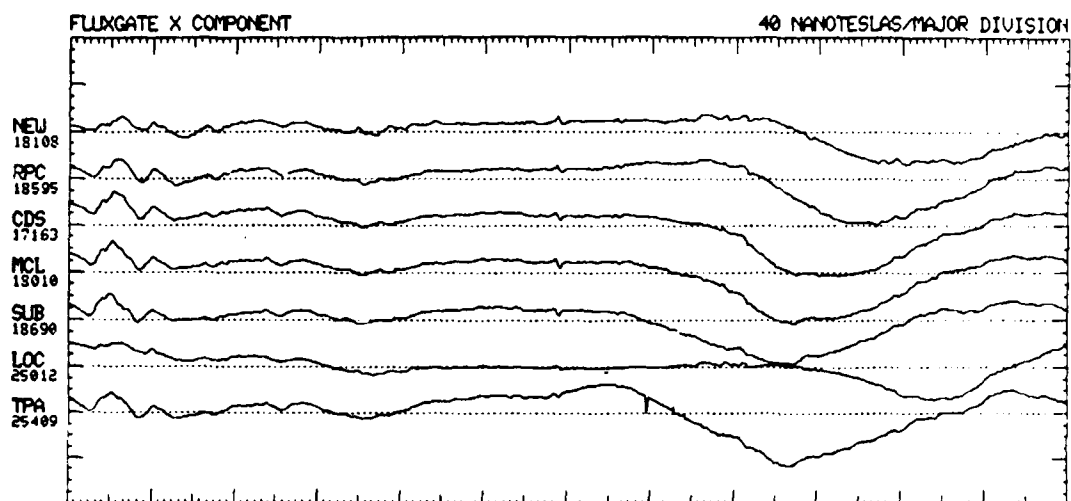


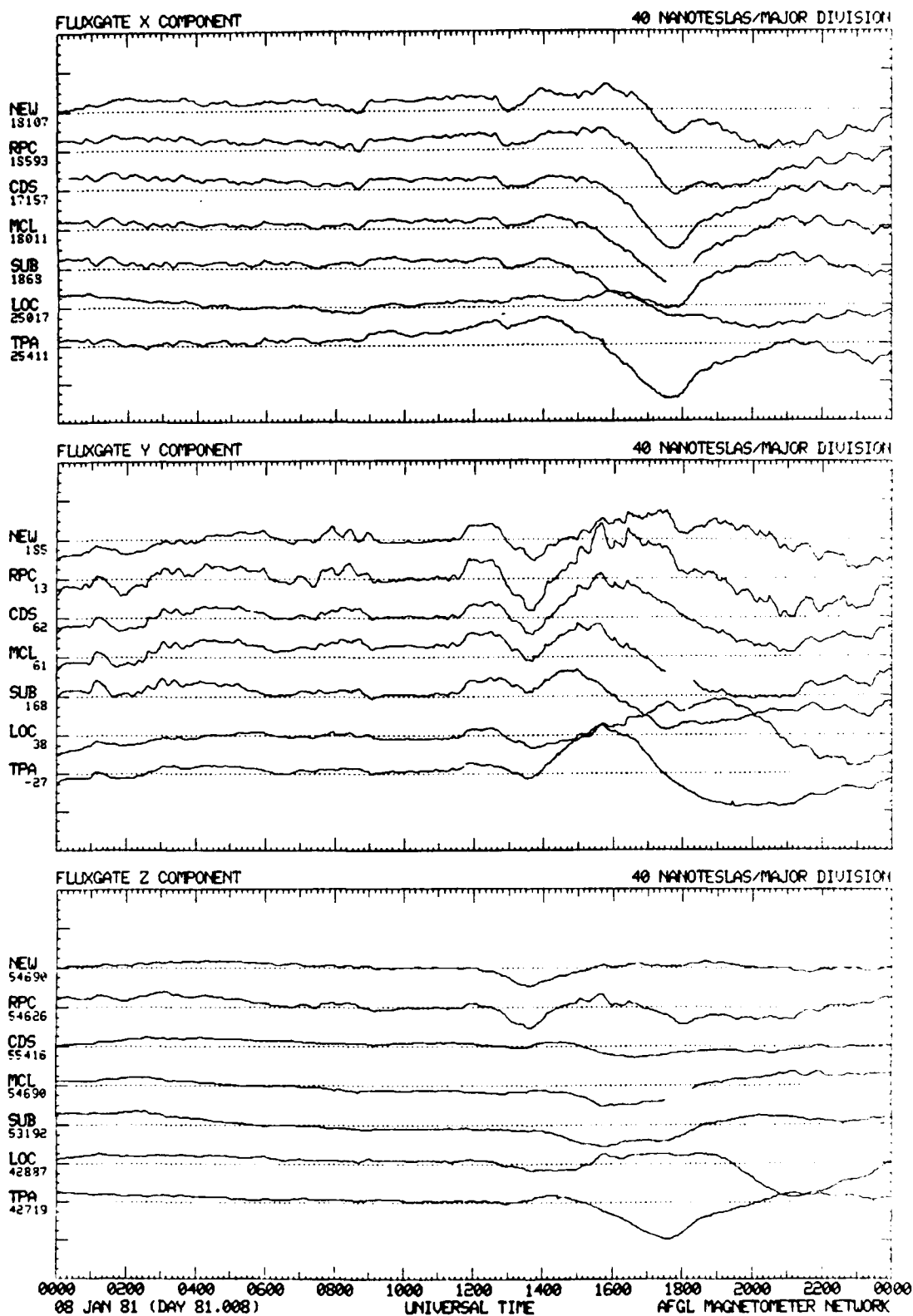


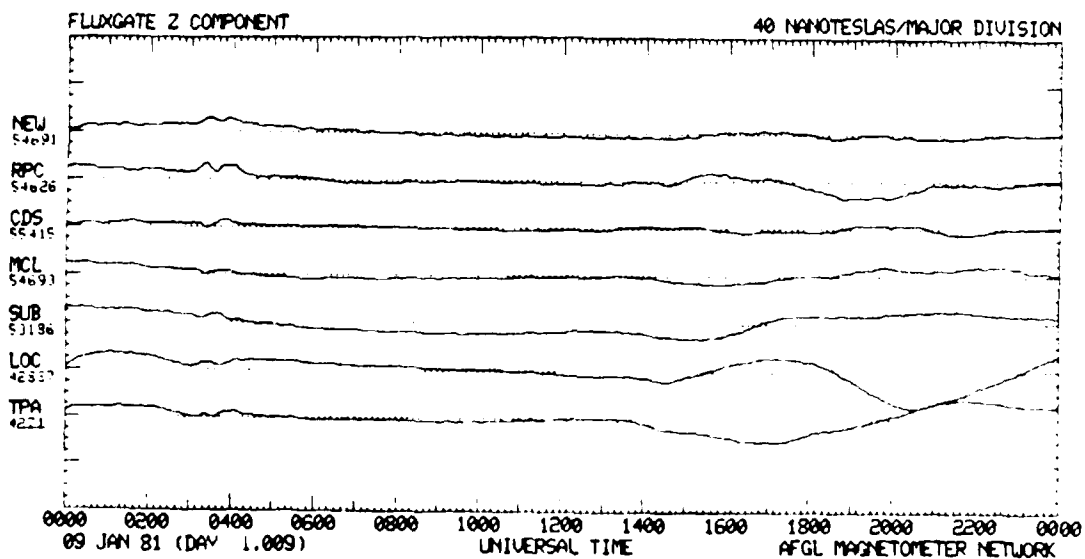
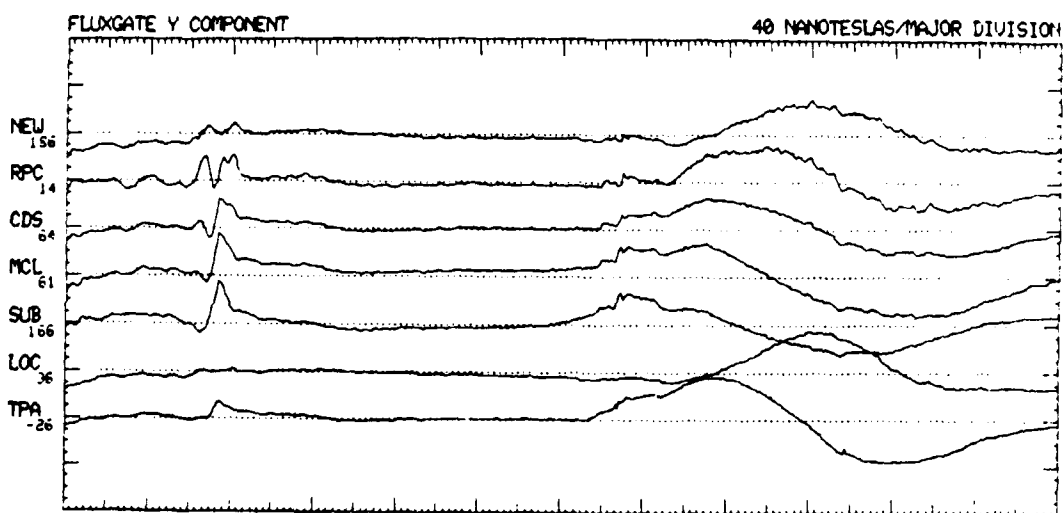
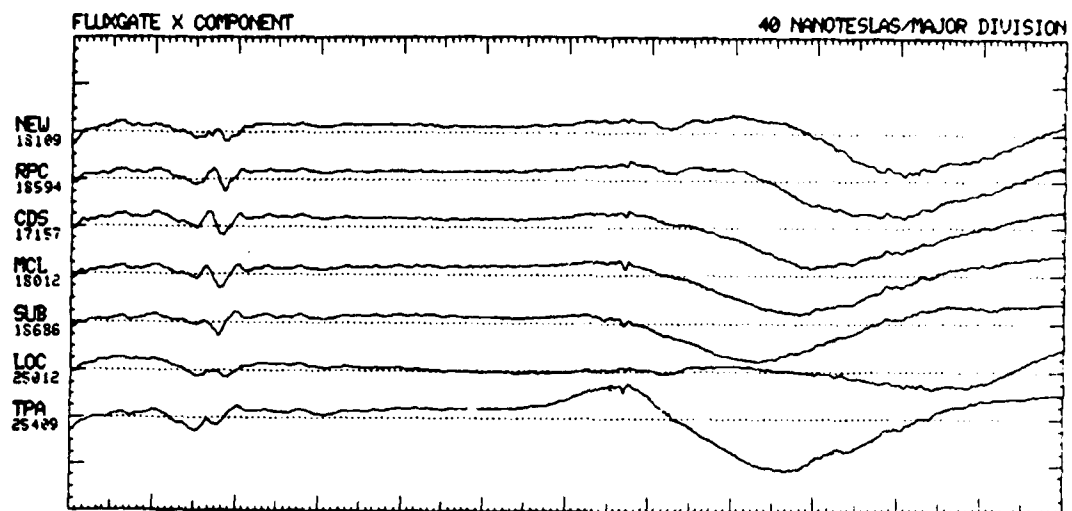


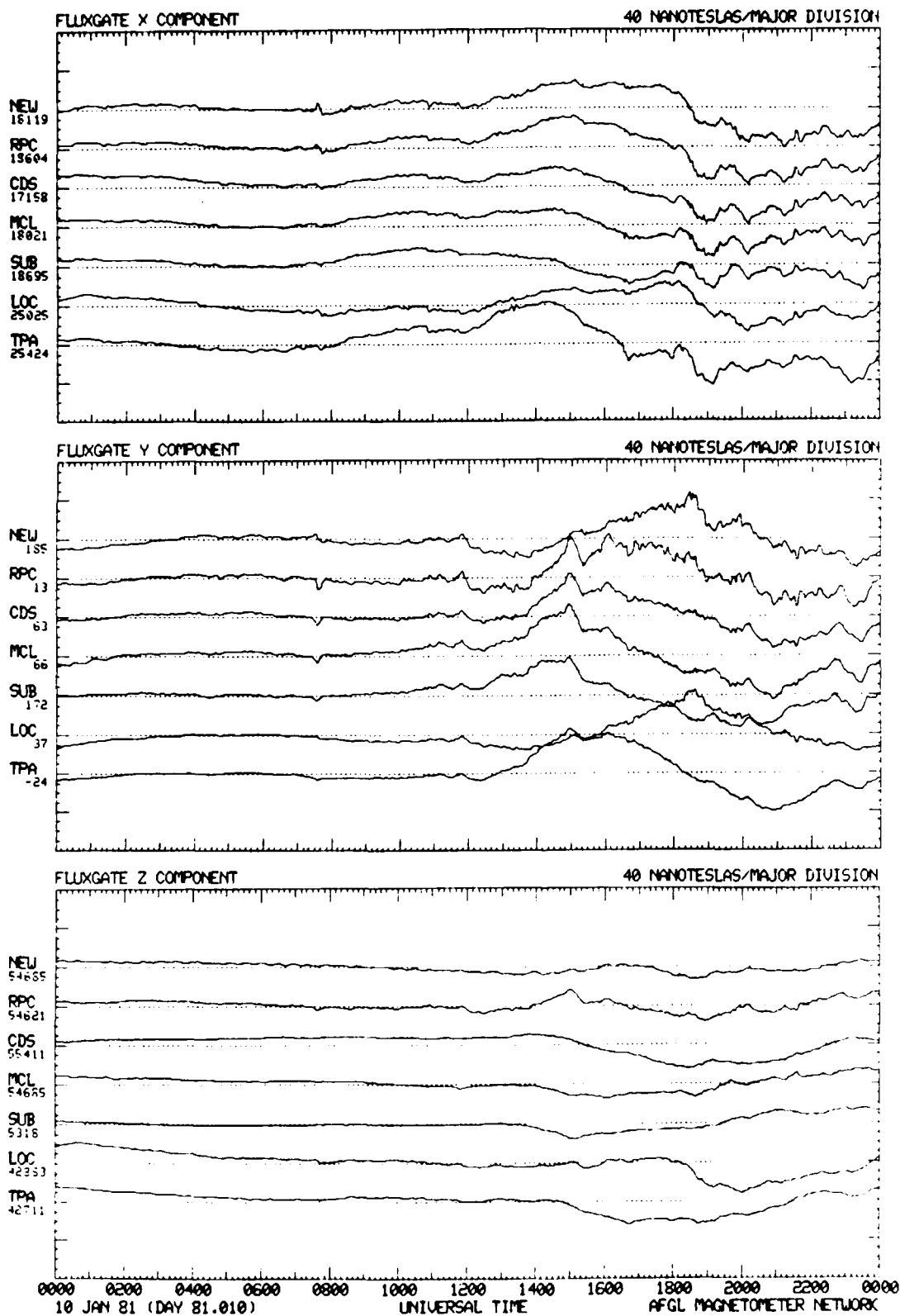


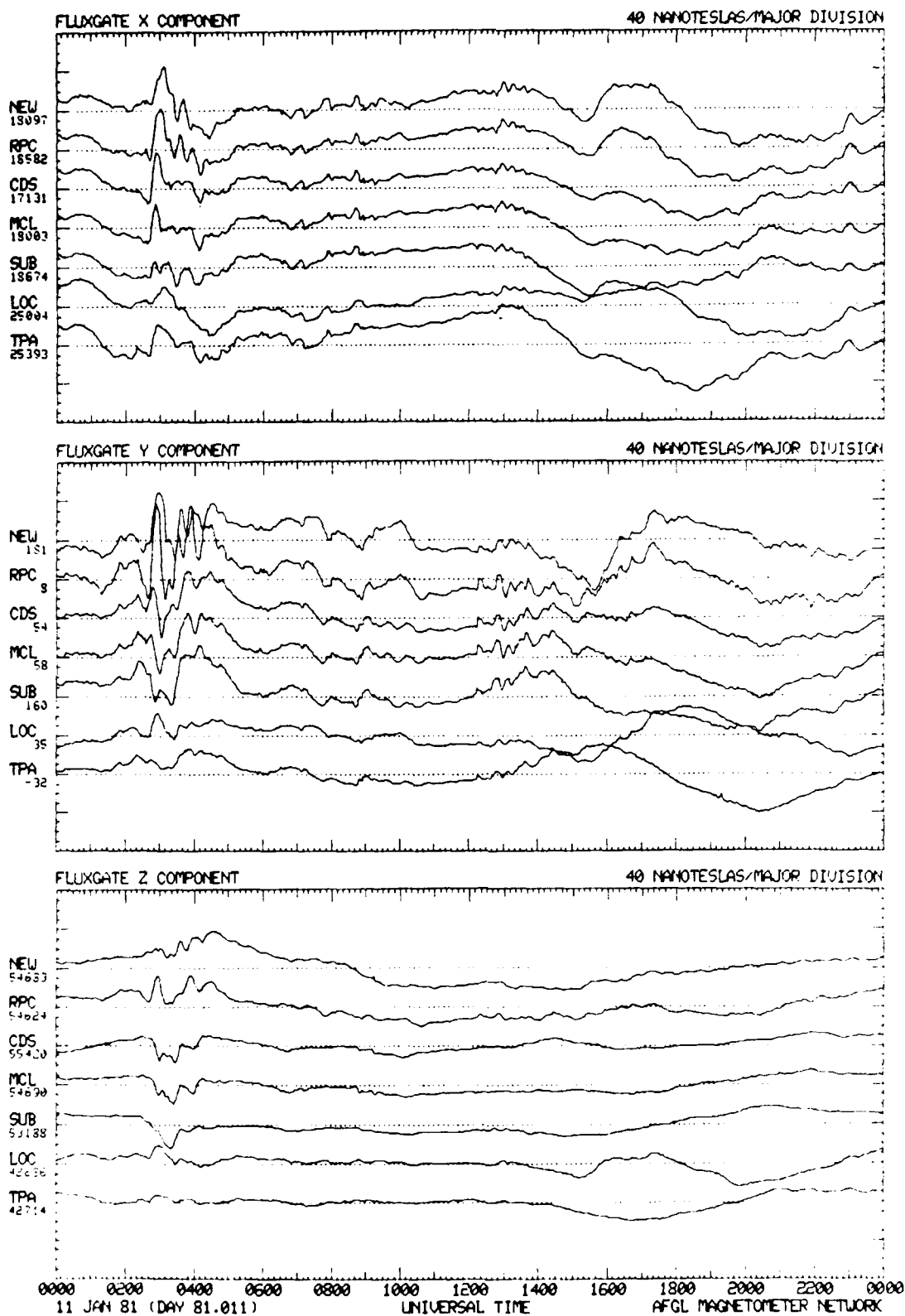








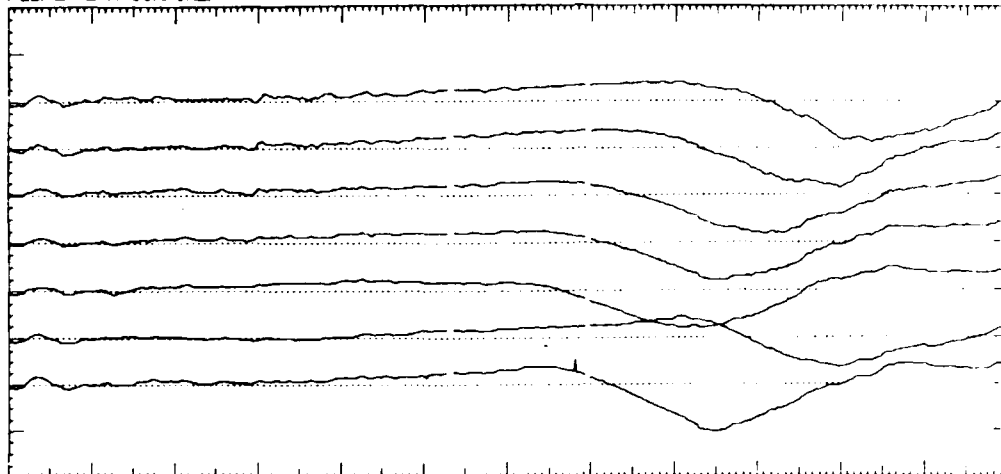




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40 NANOTESLAS/MAJOR DIVISION

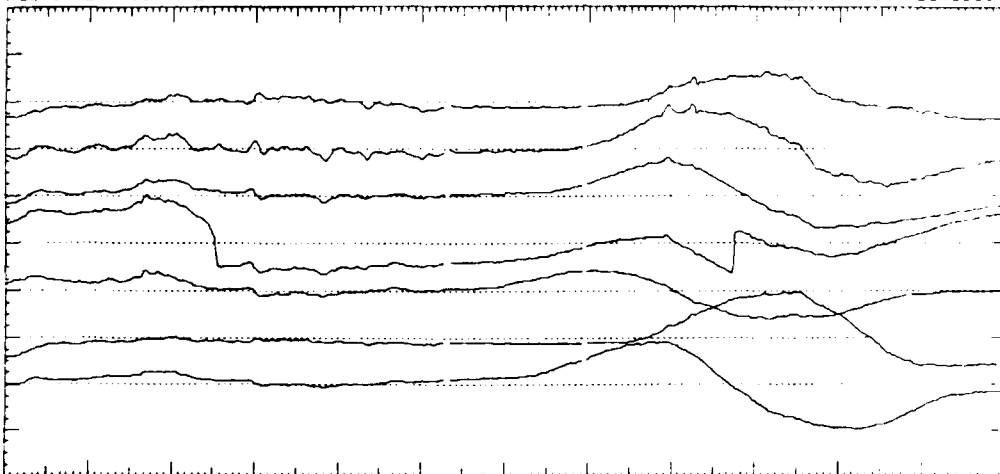
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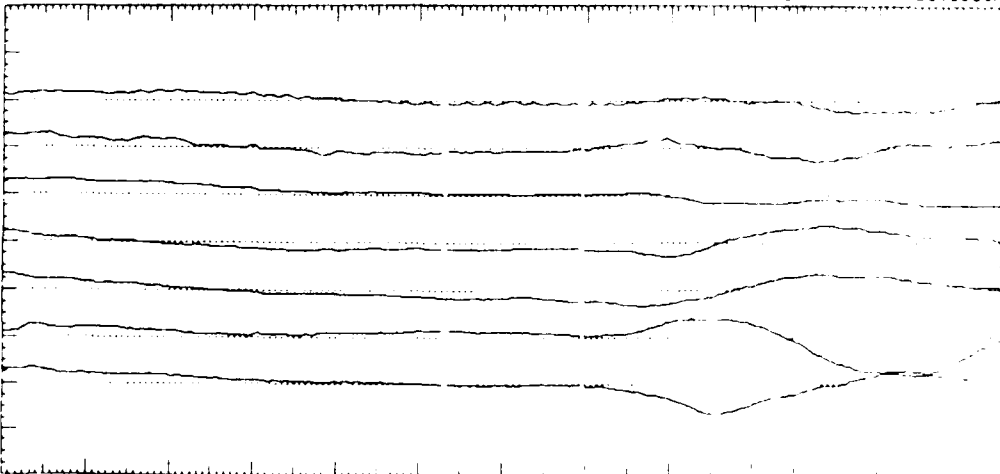
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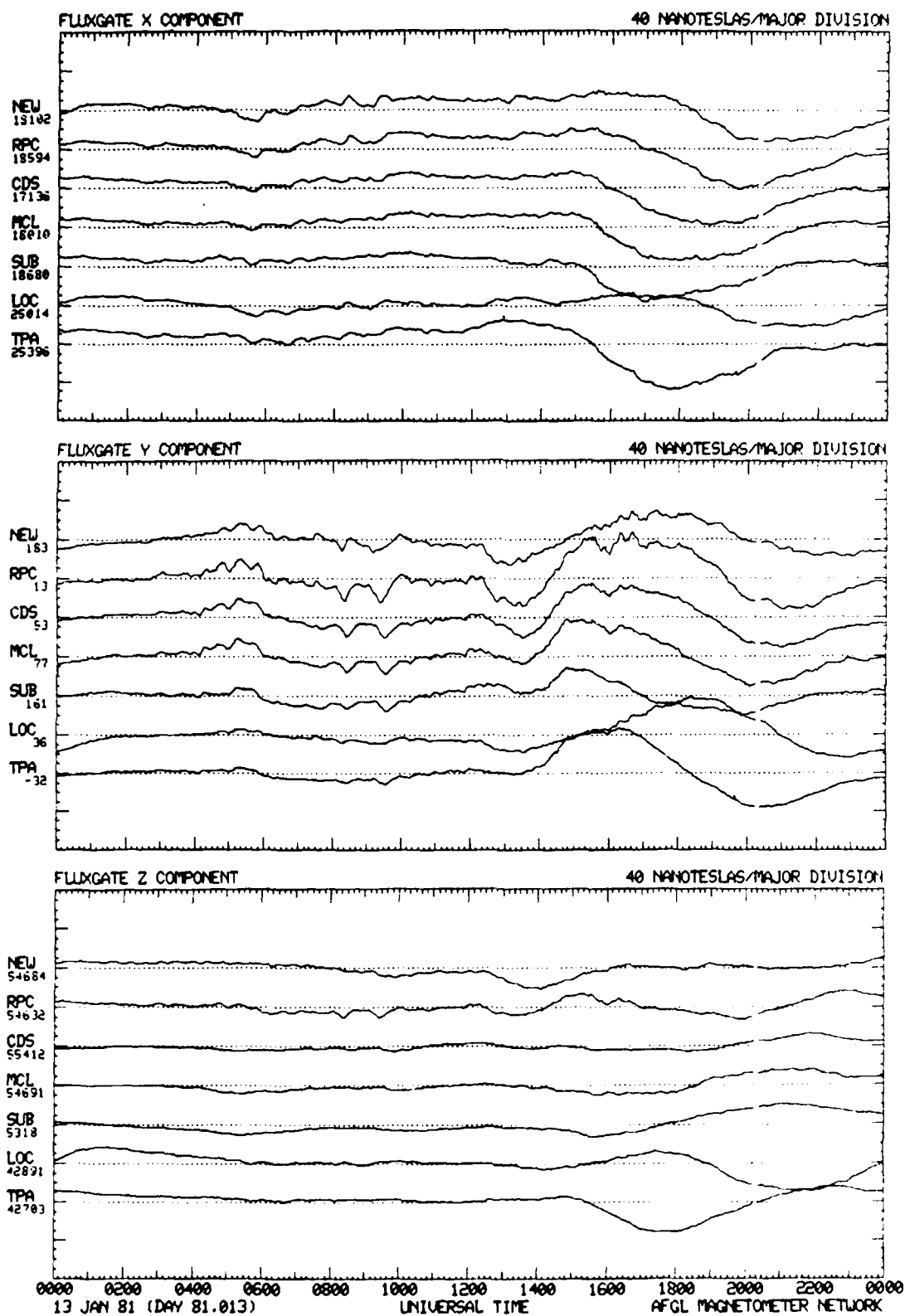
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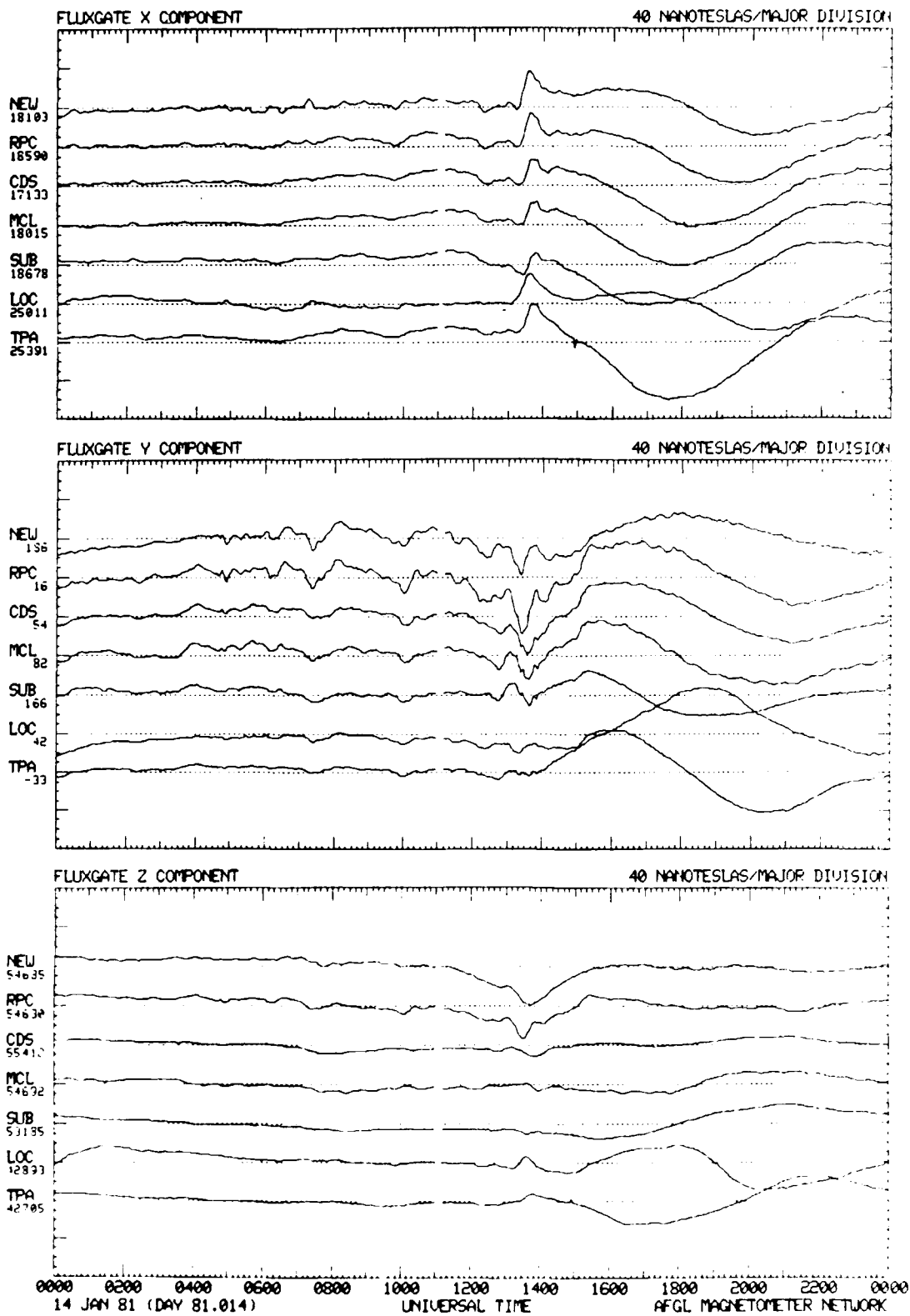
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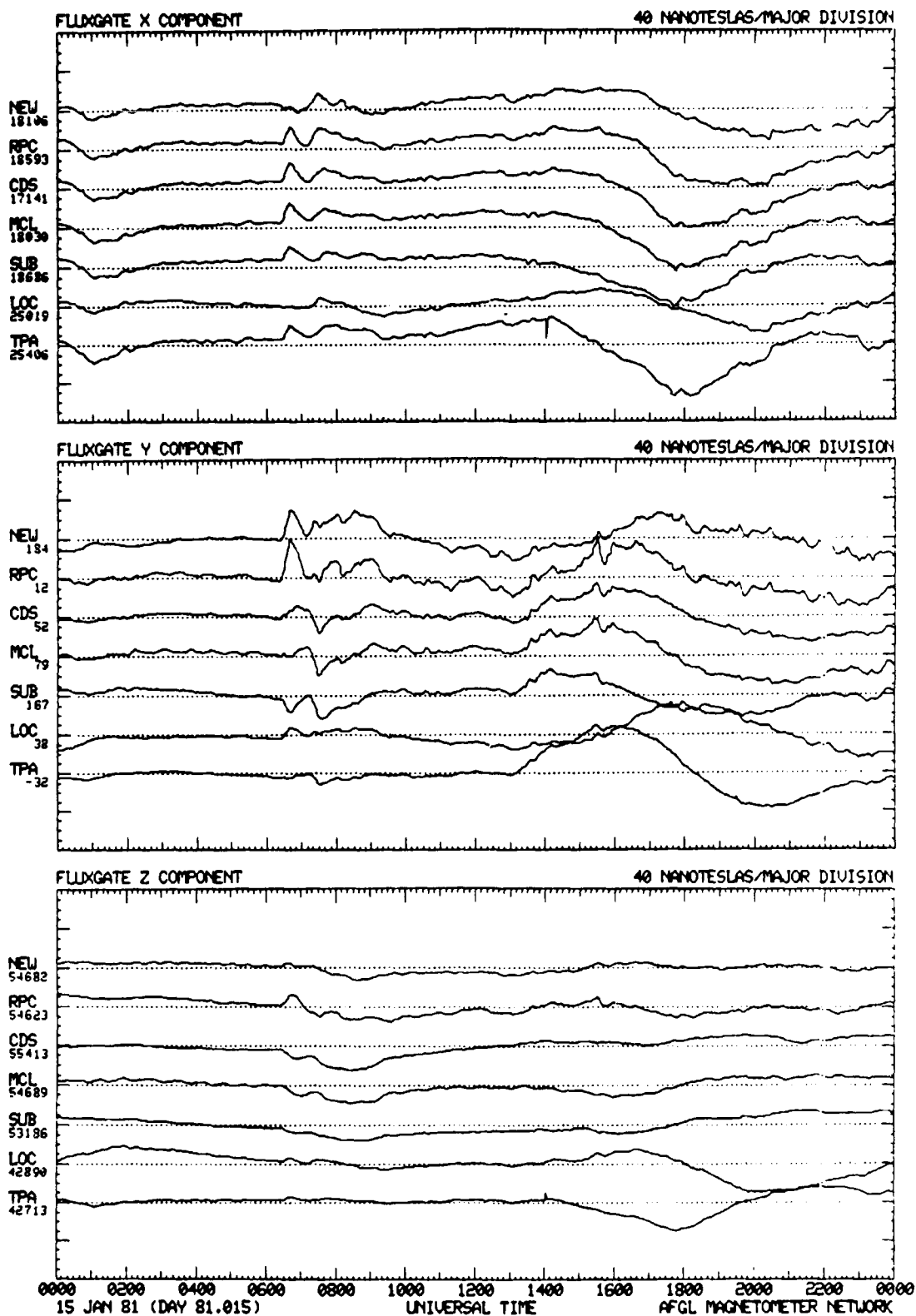


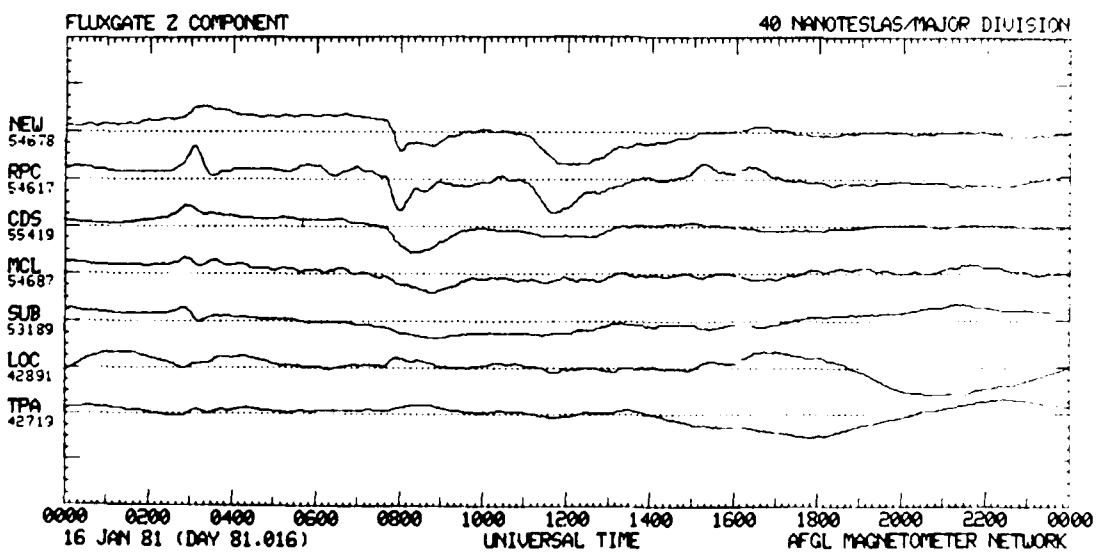
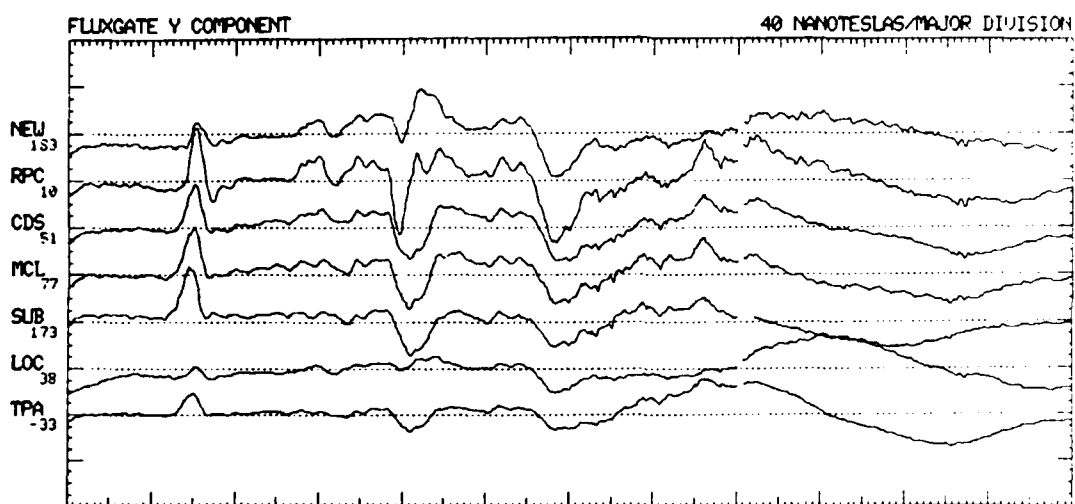
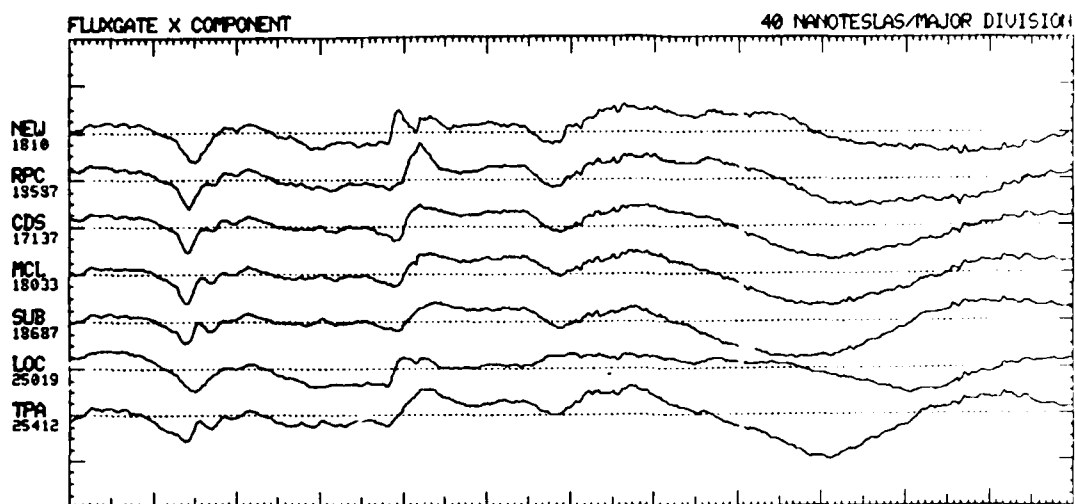
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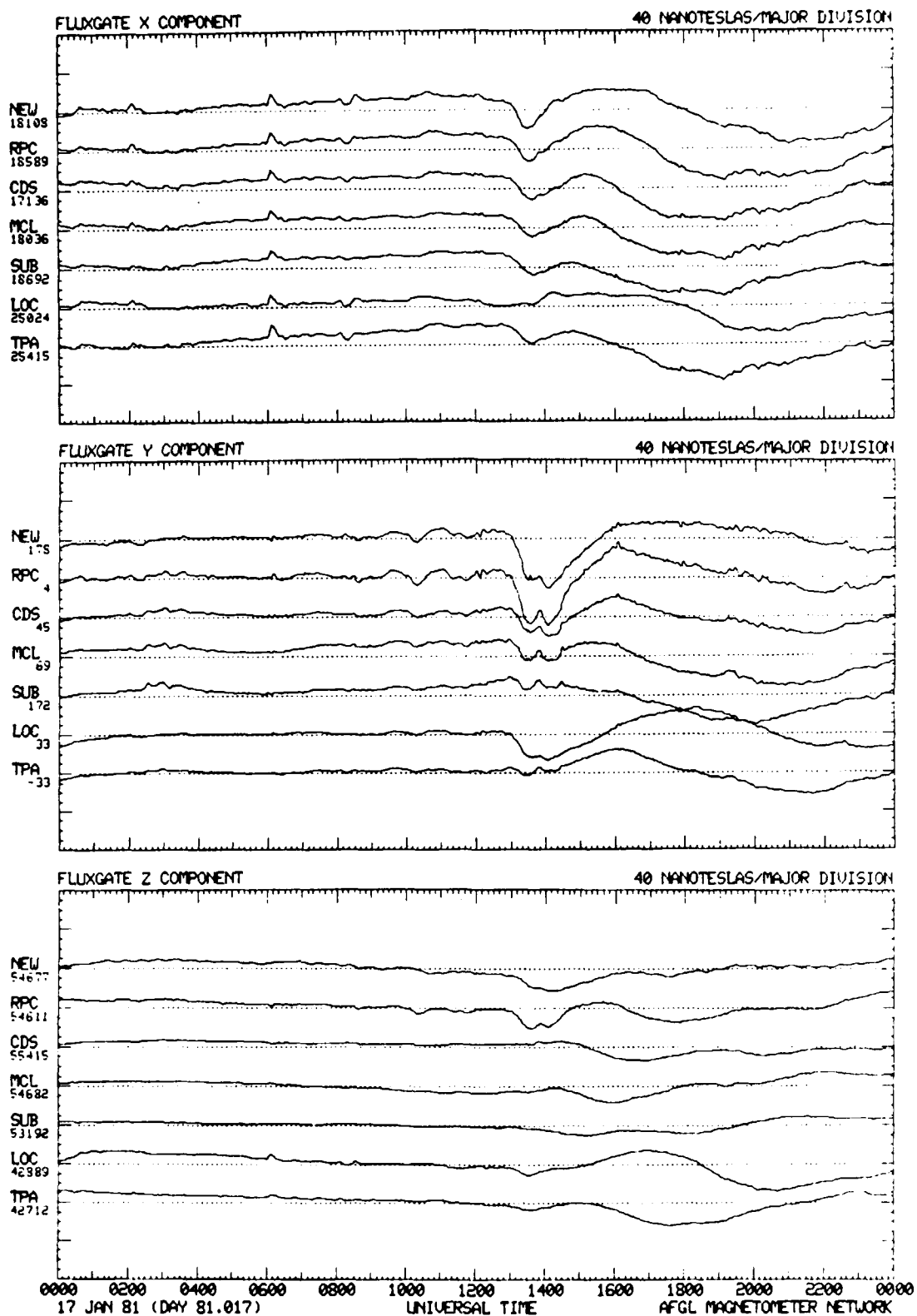


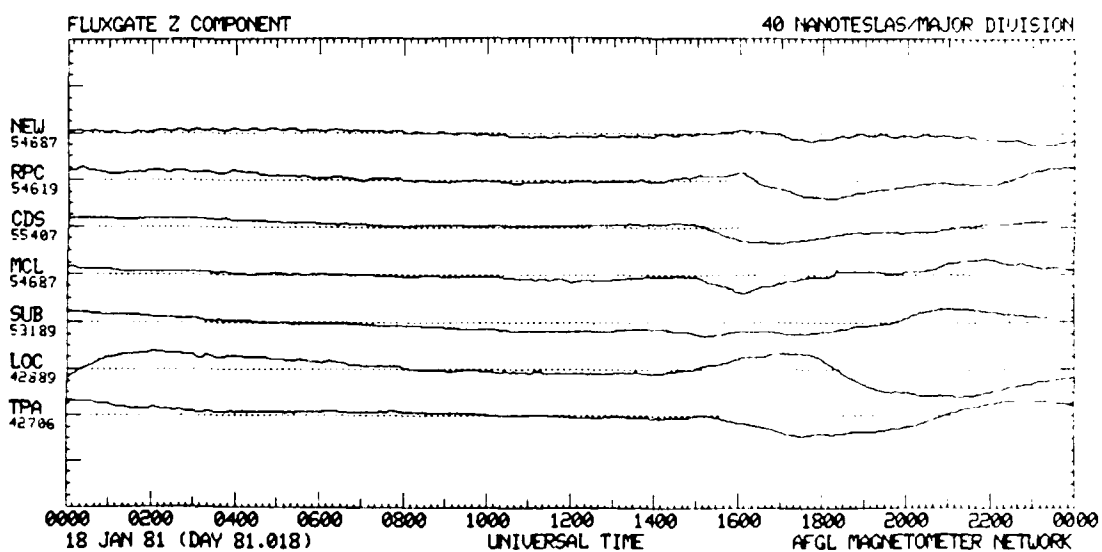
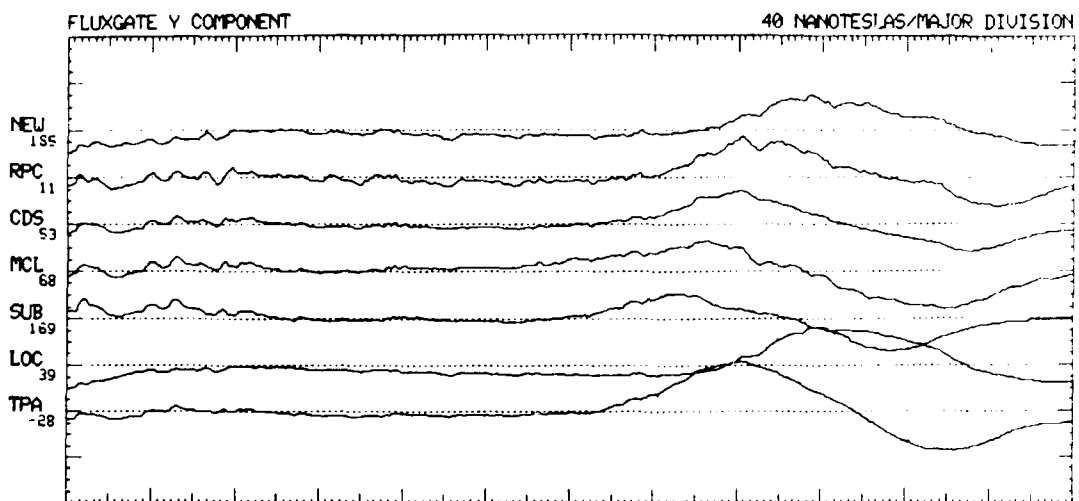
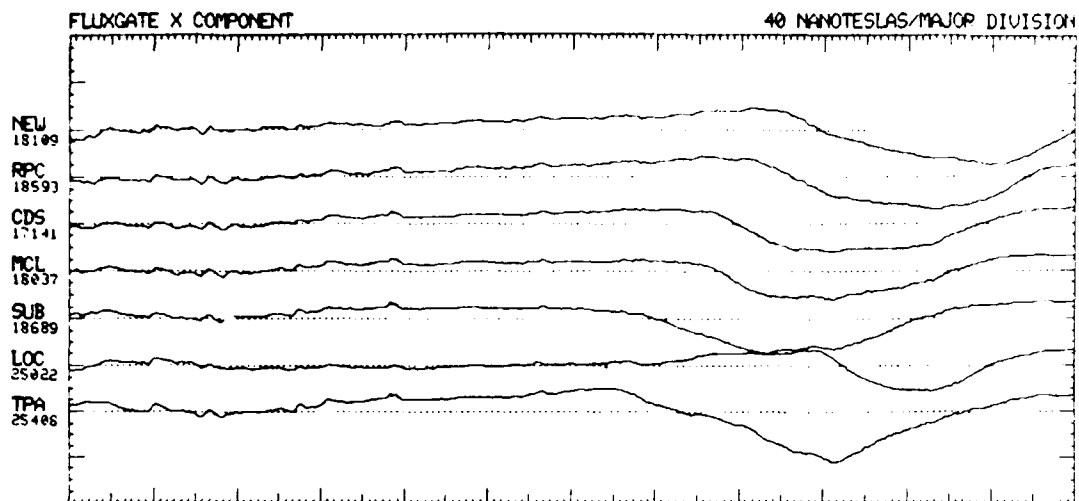


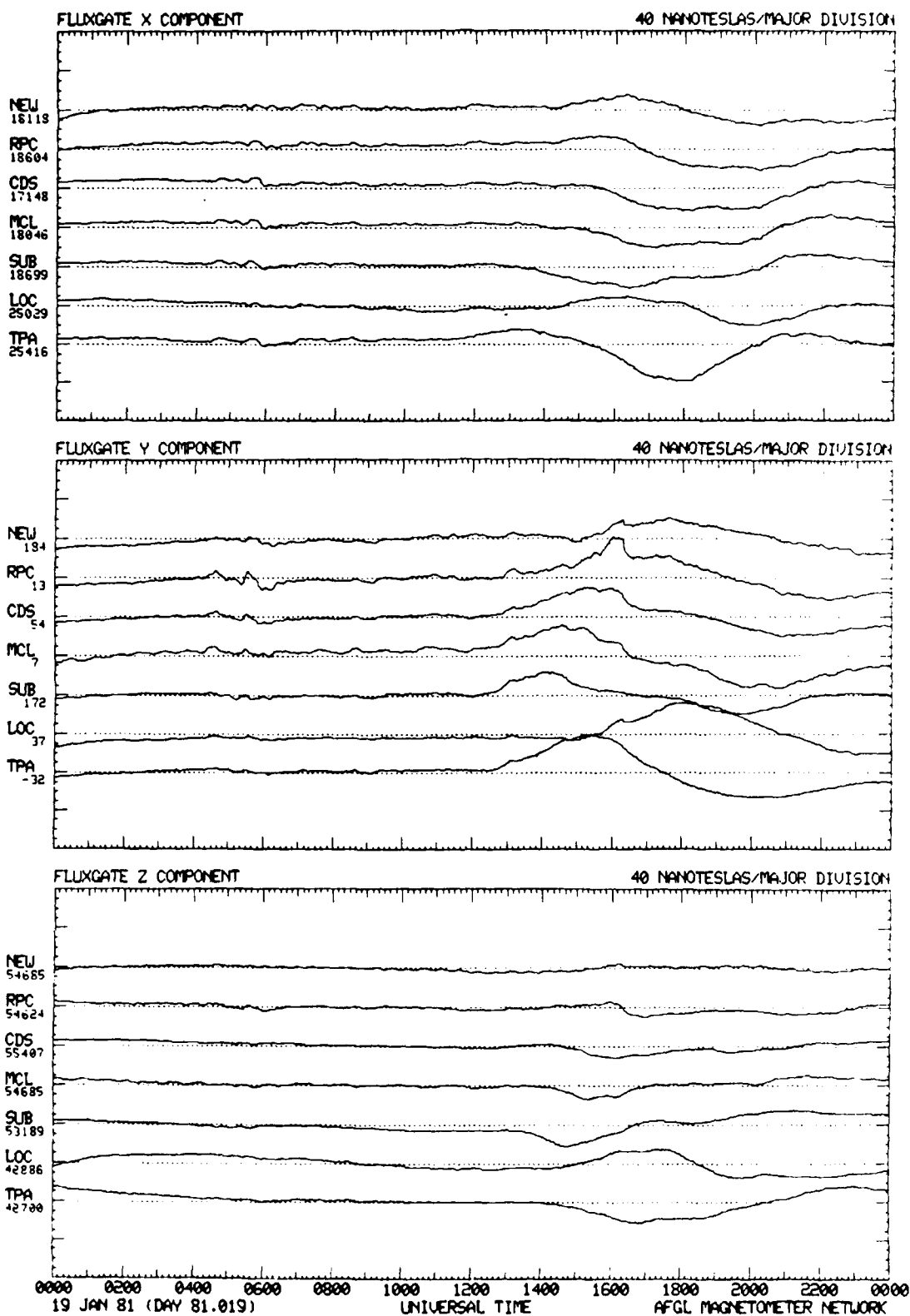


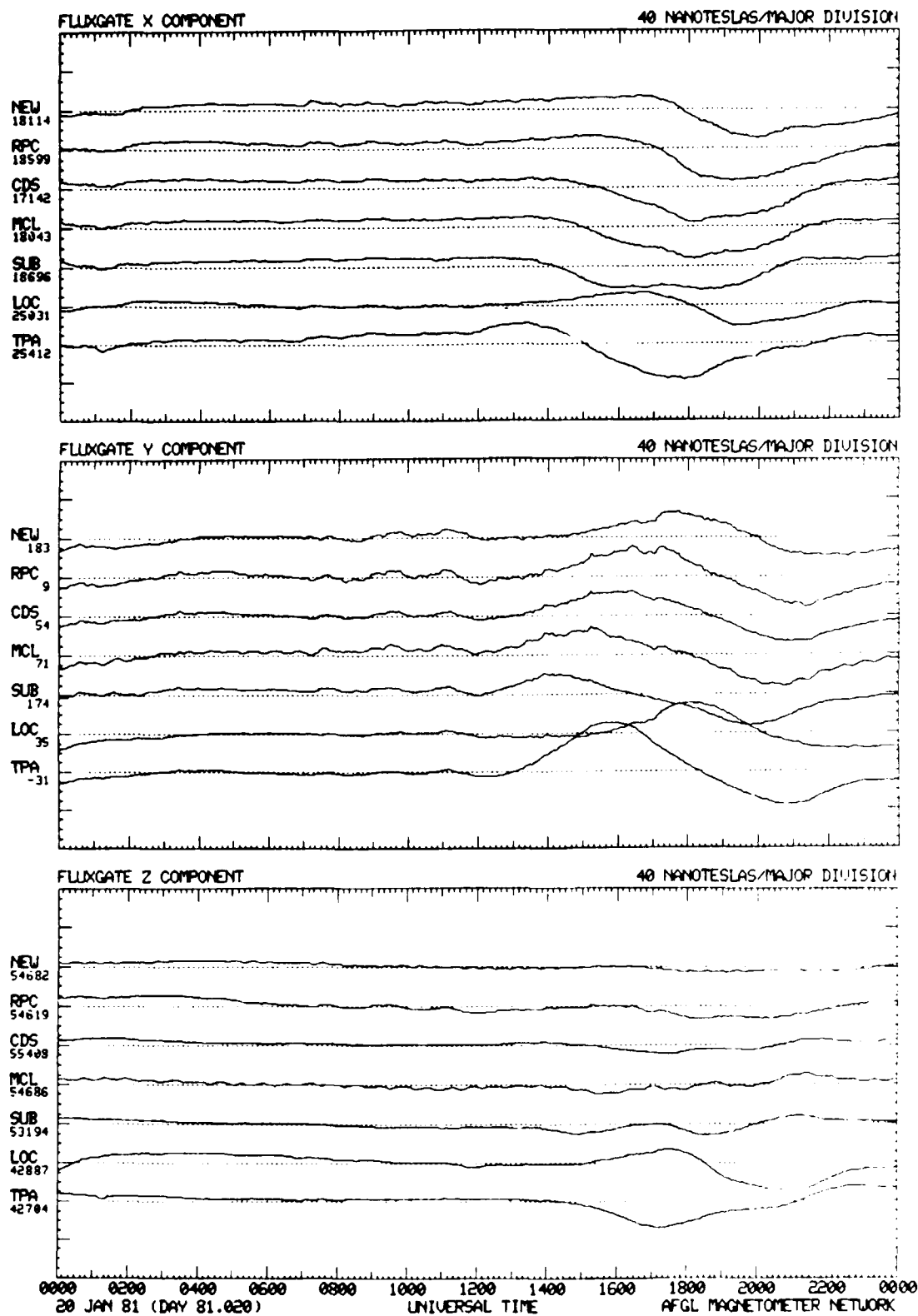


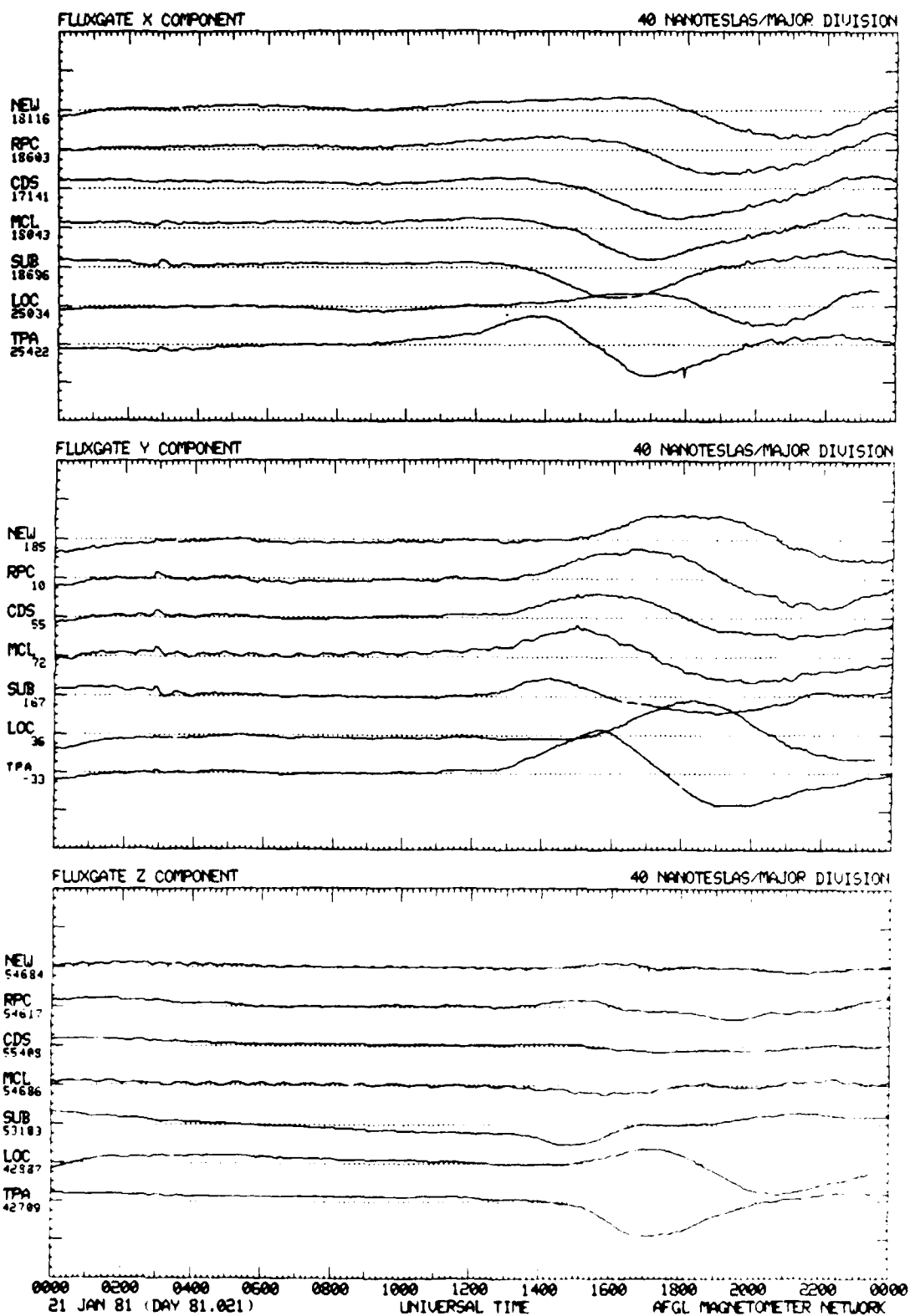


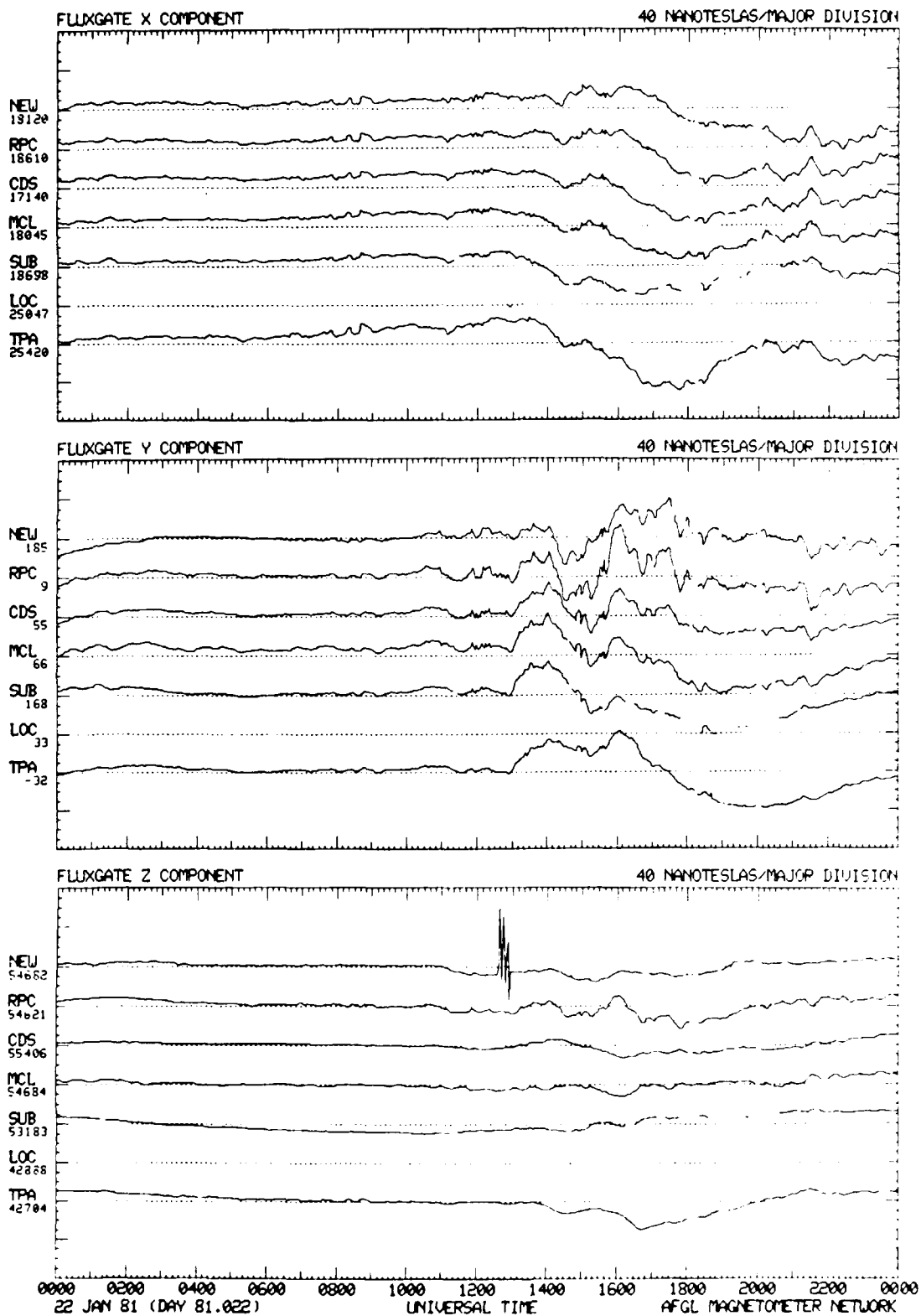




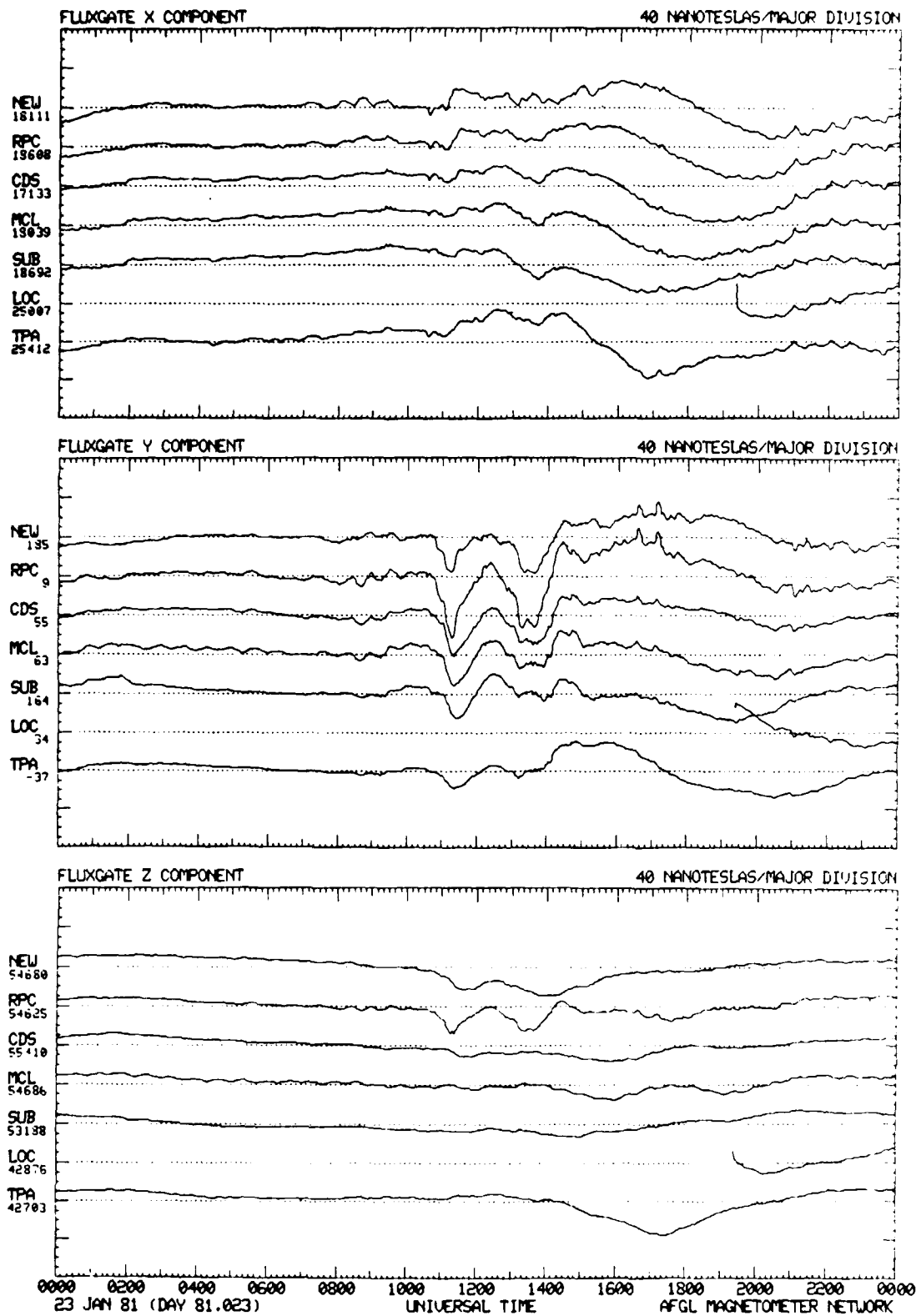


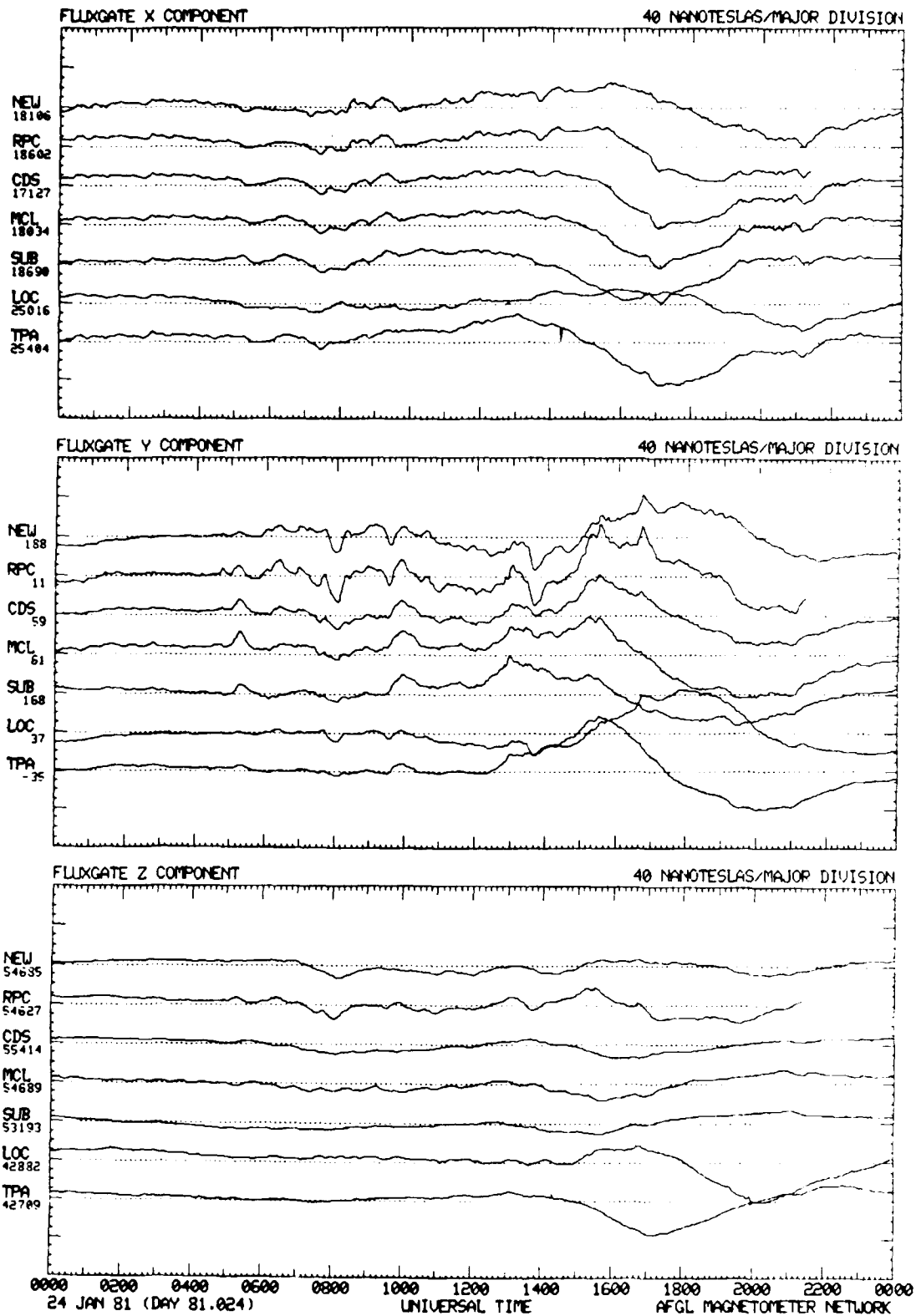


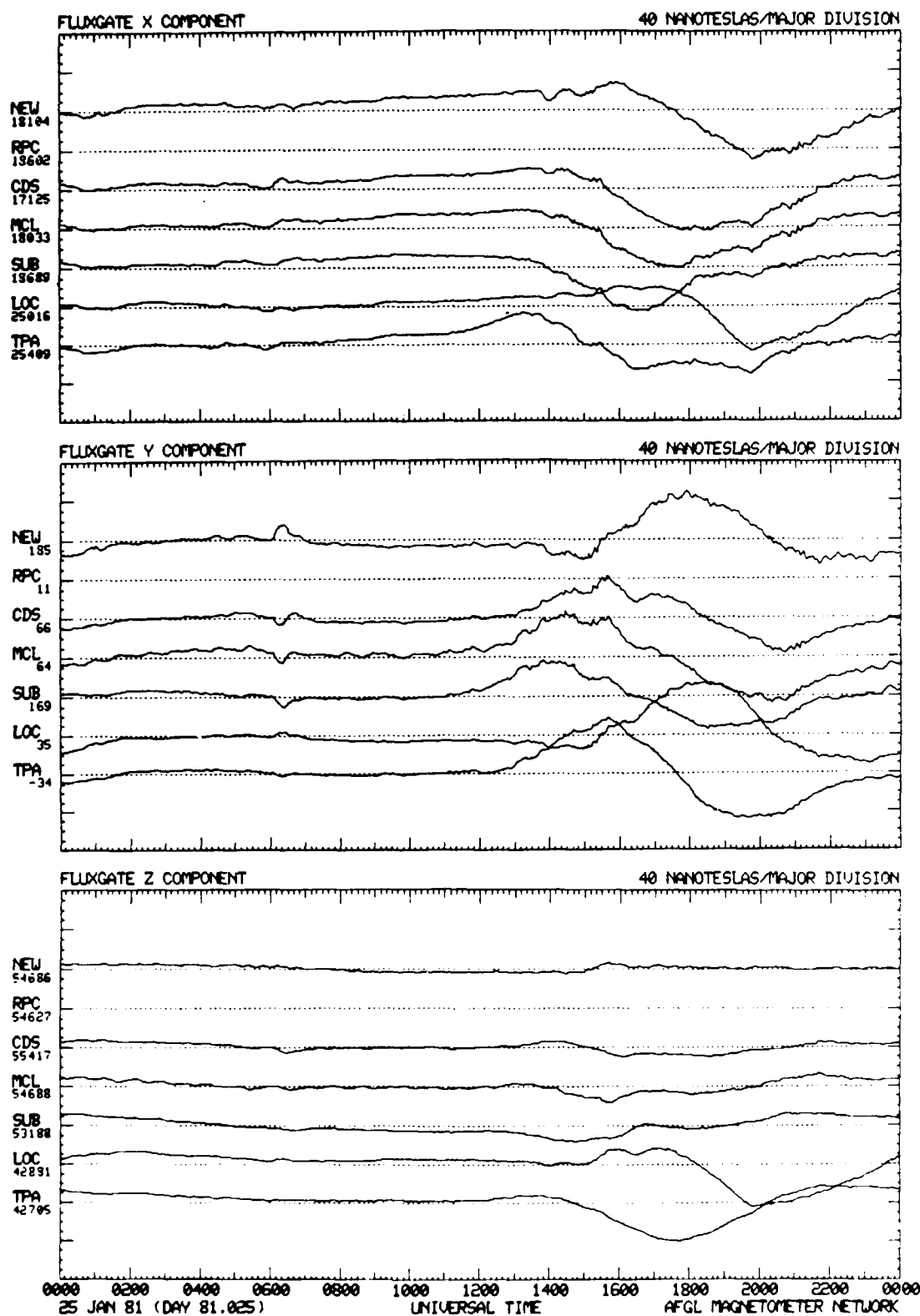


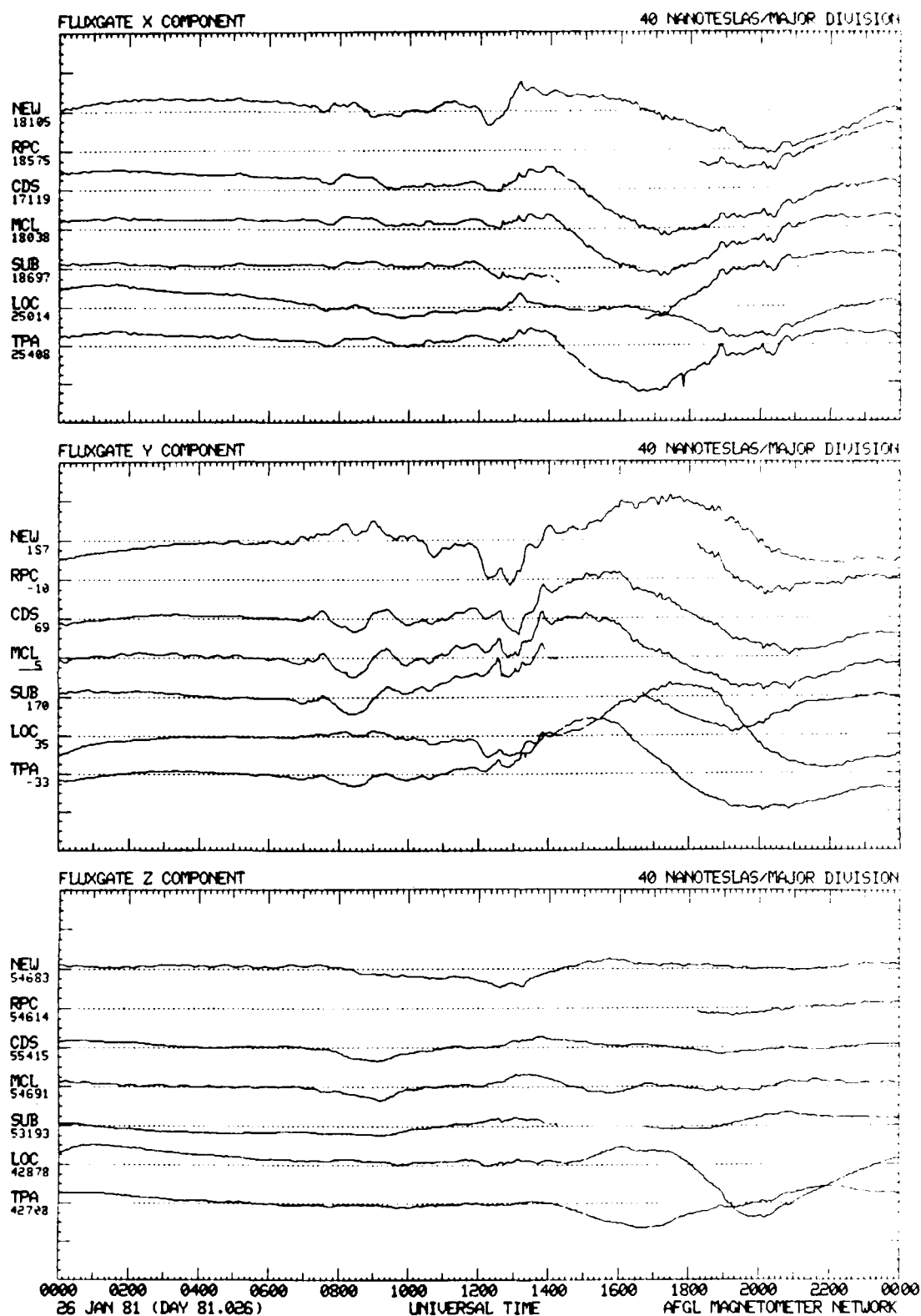


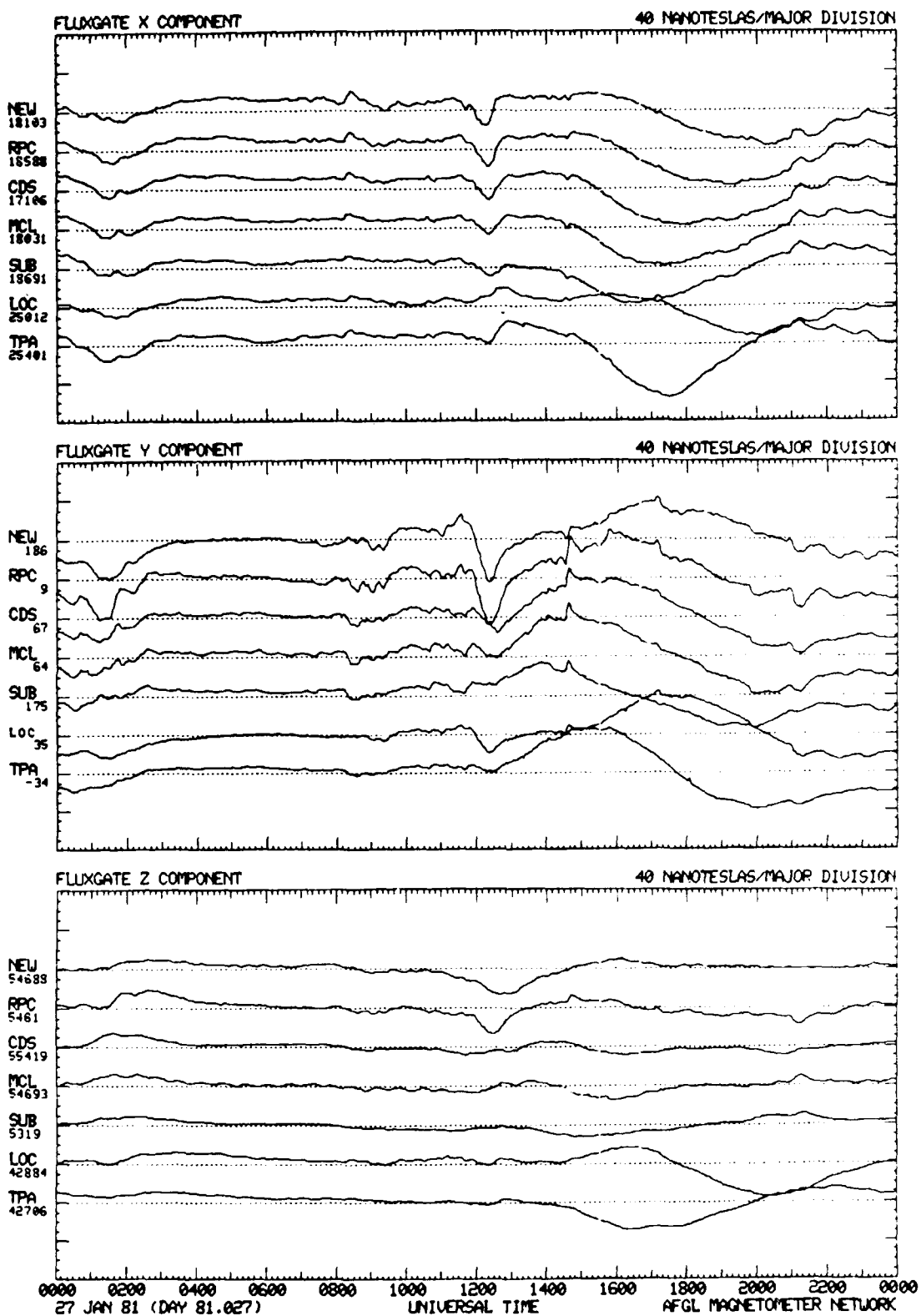


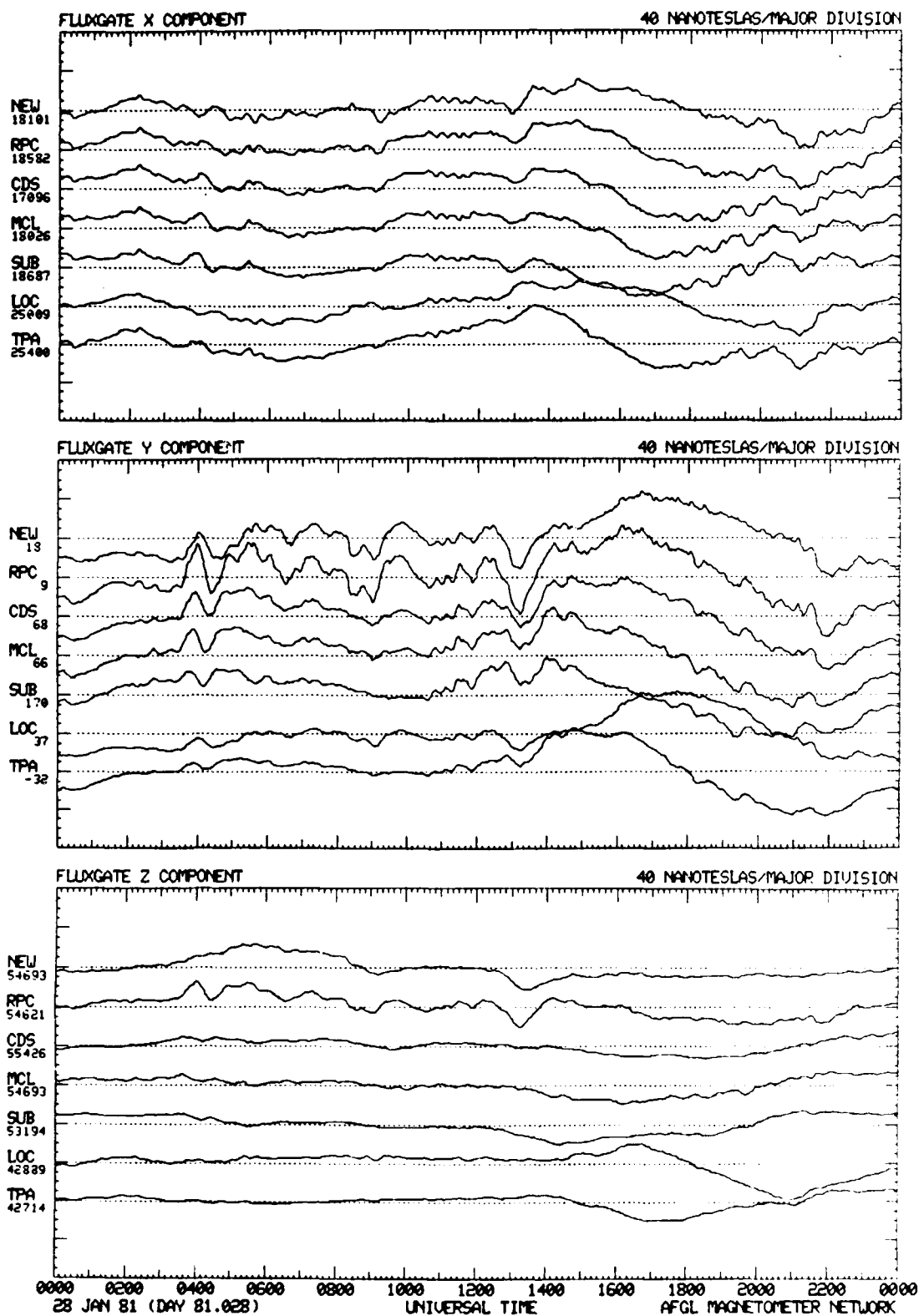


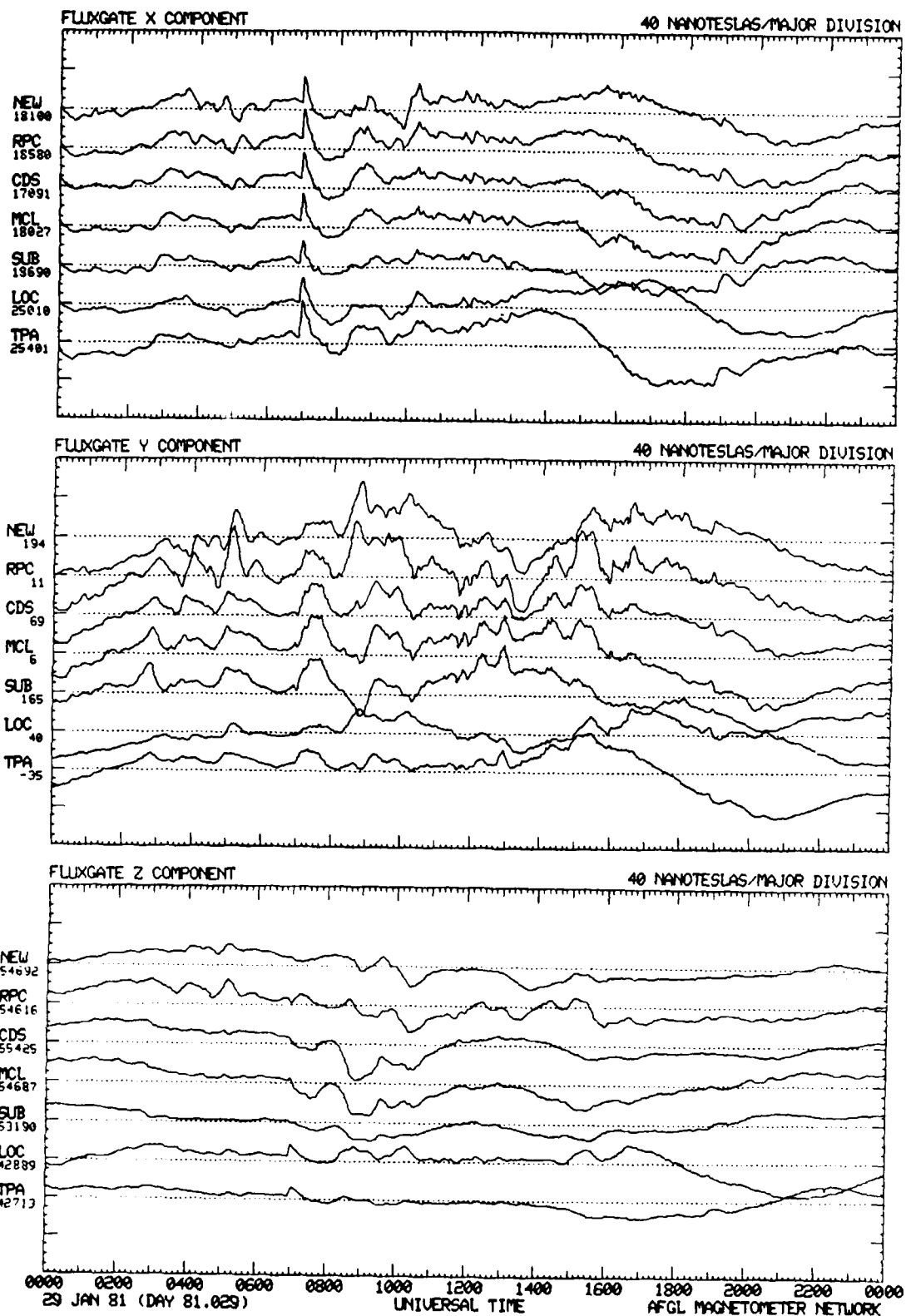


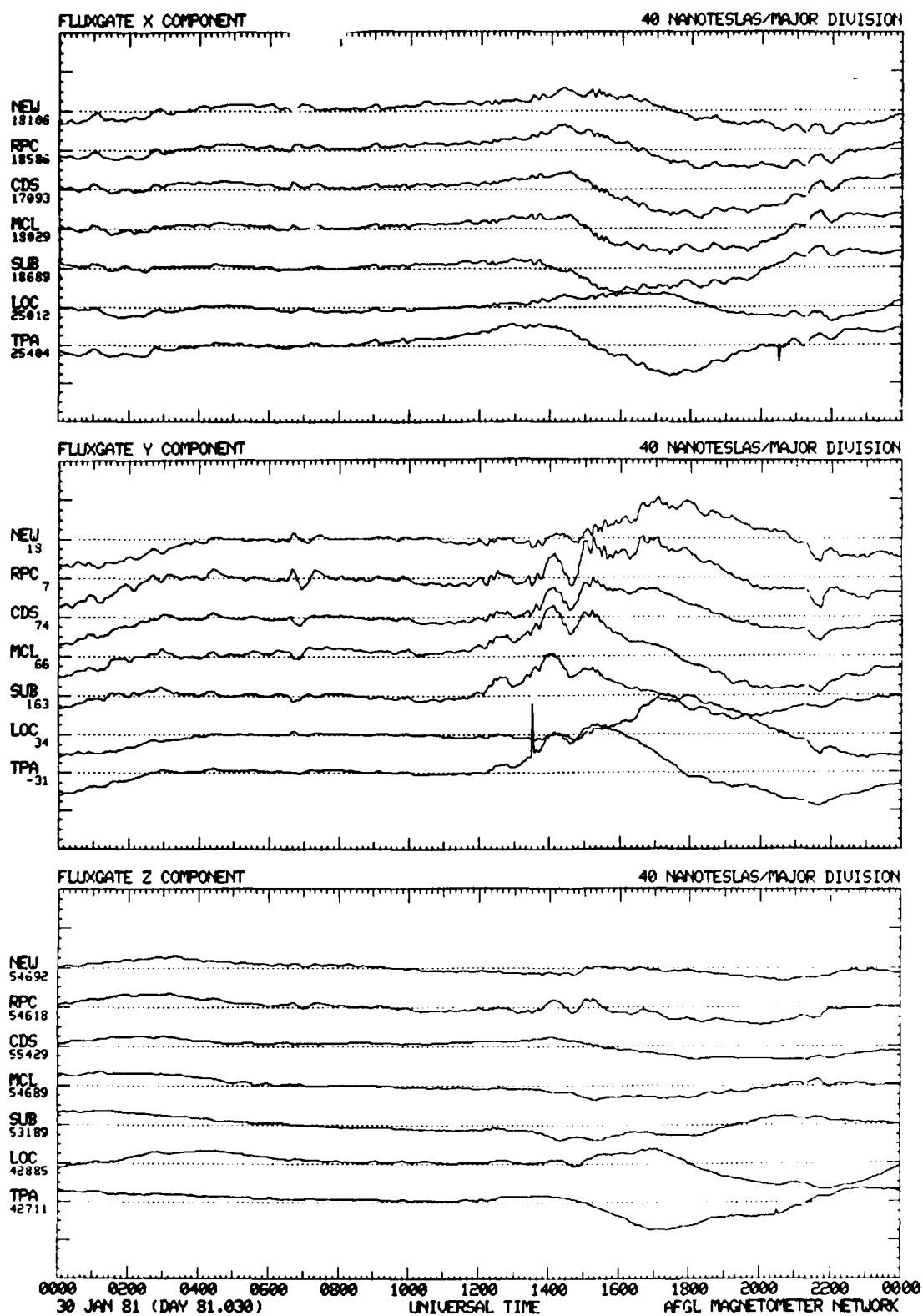




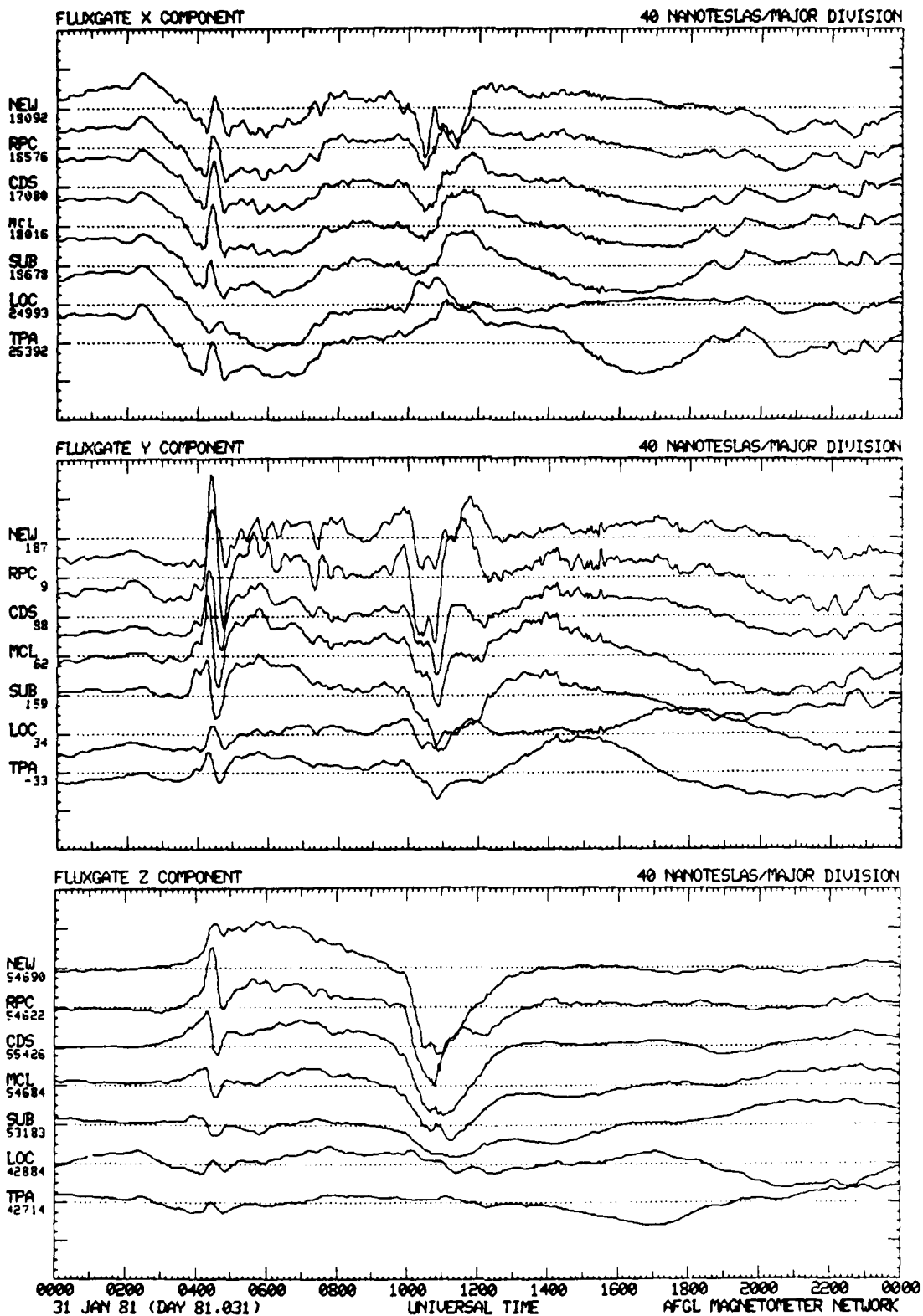


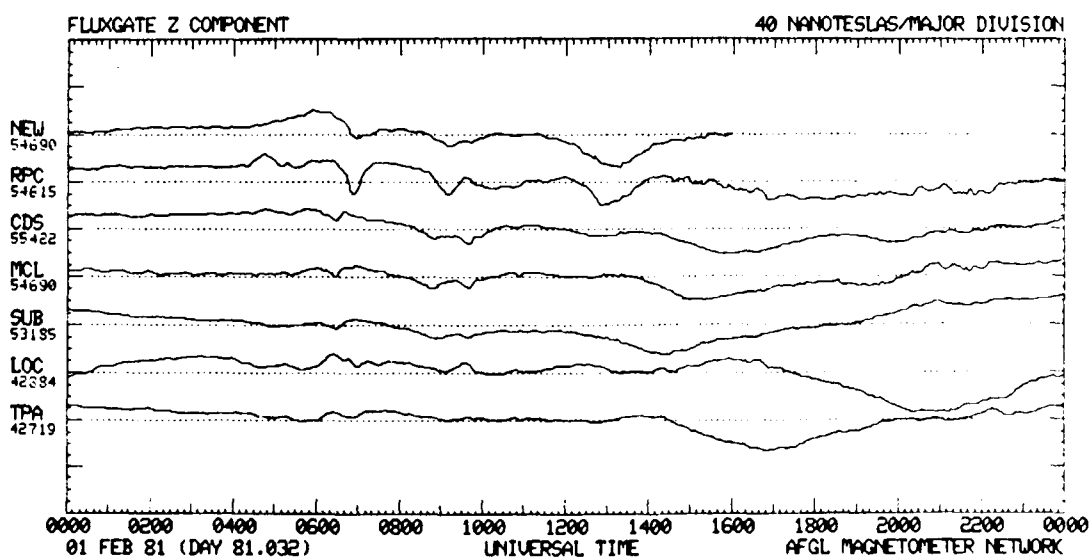
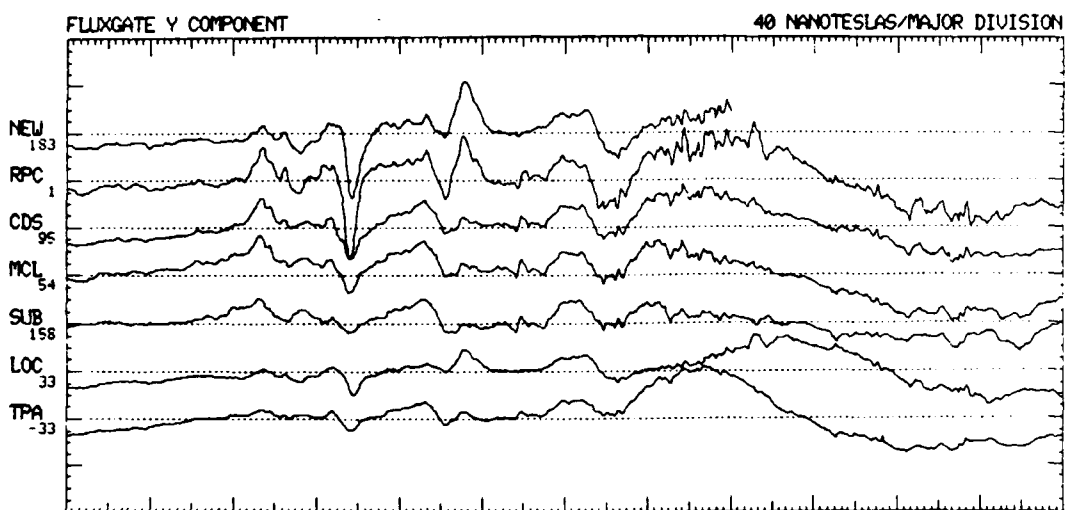
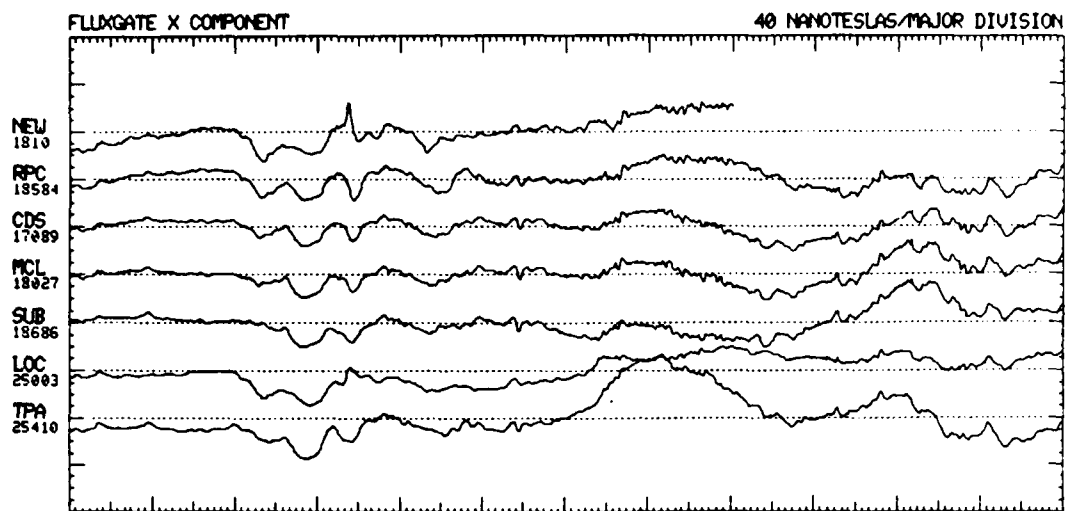


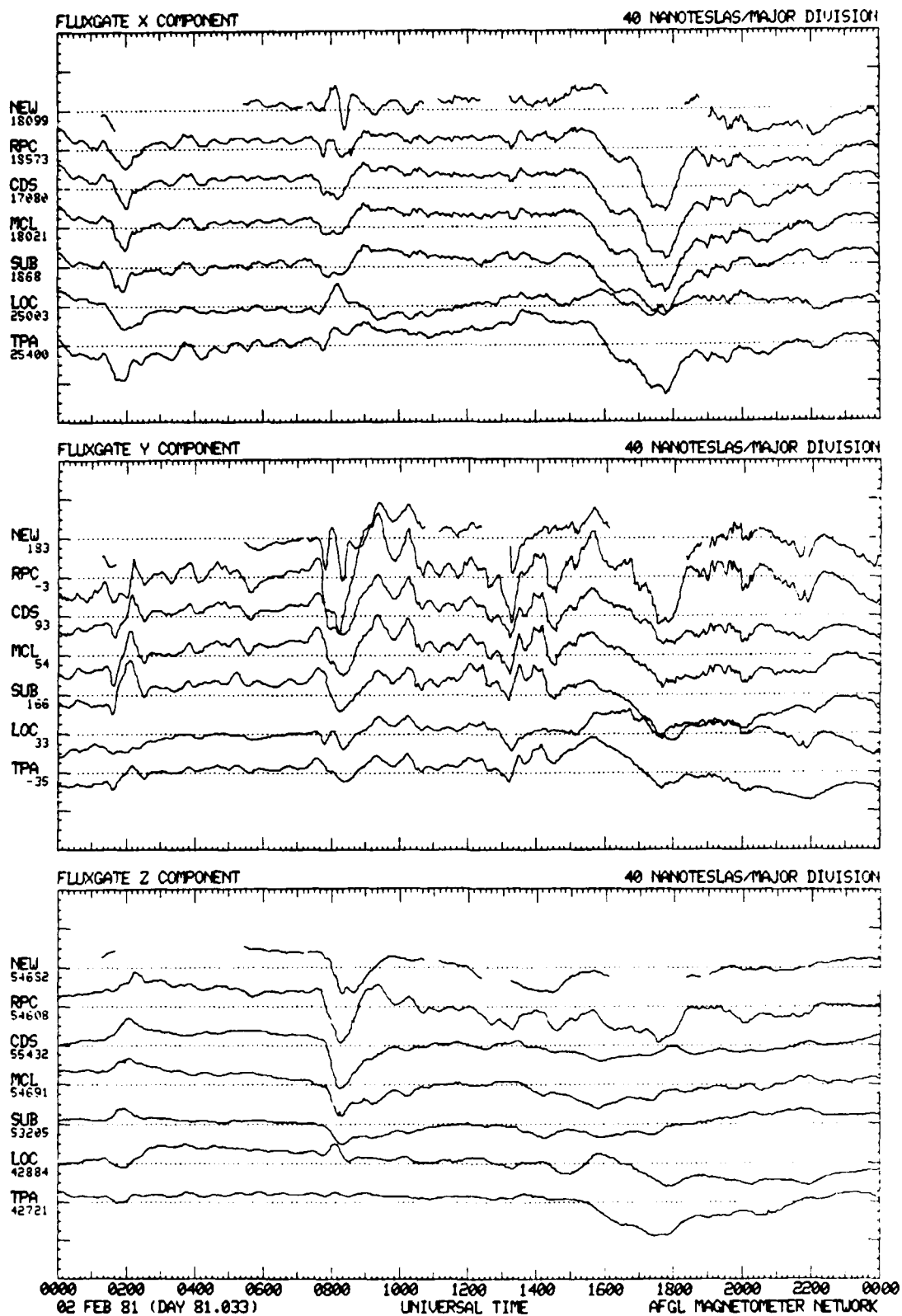


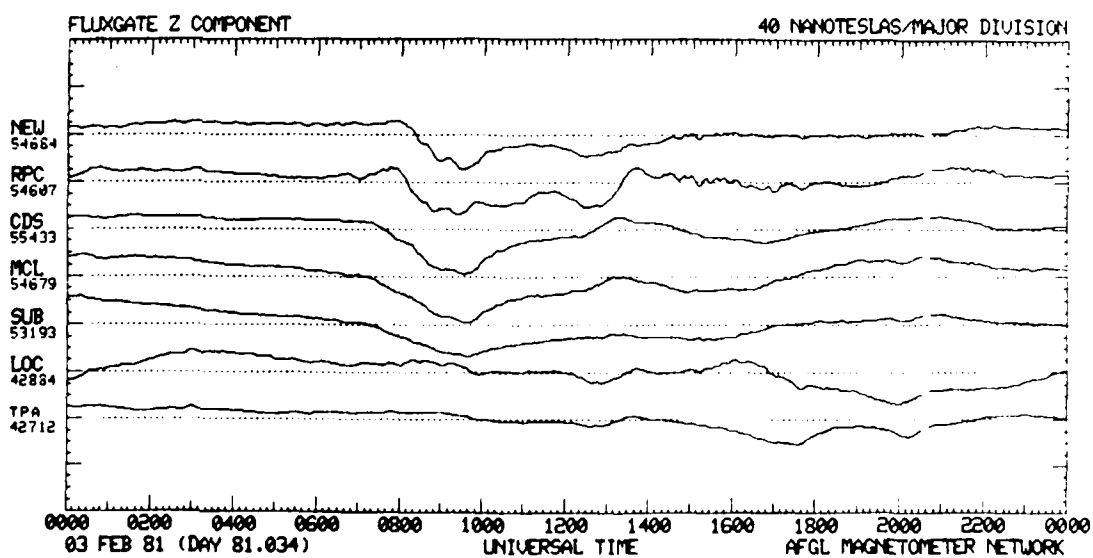
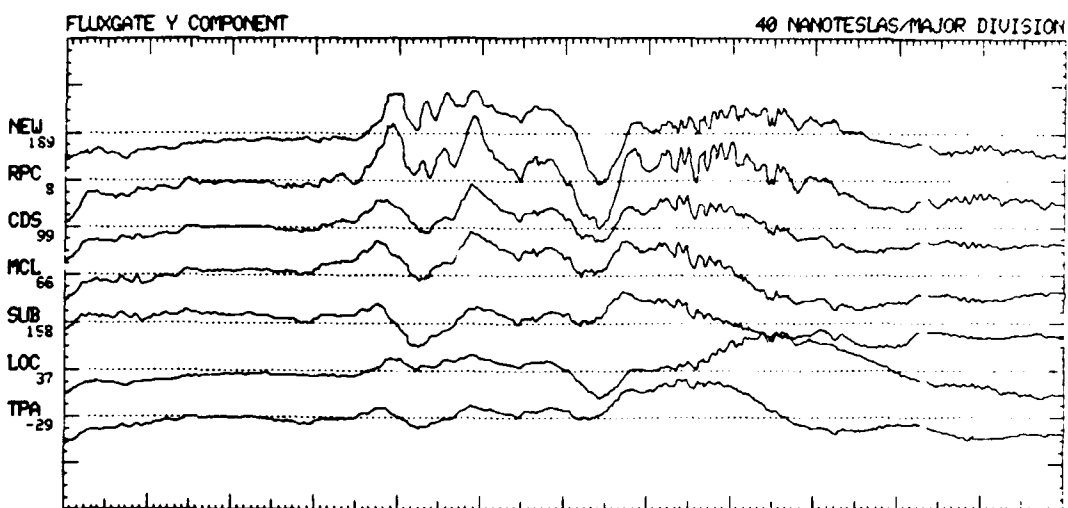
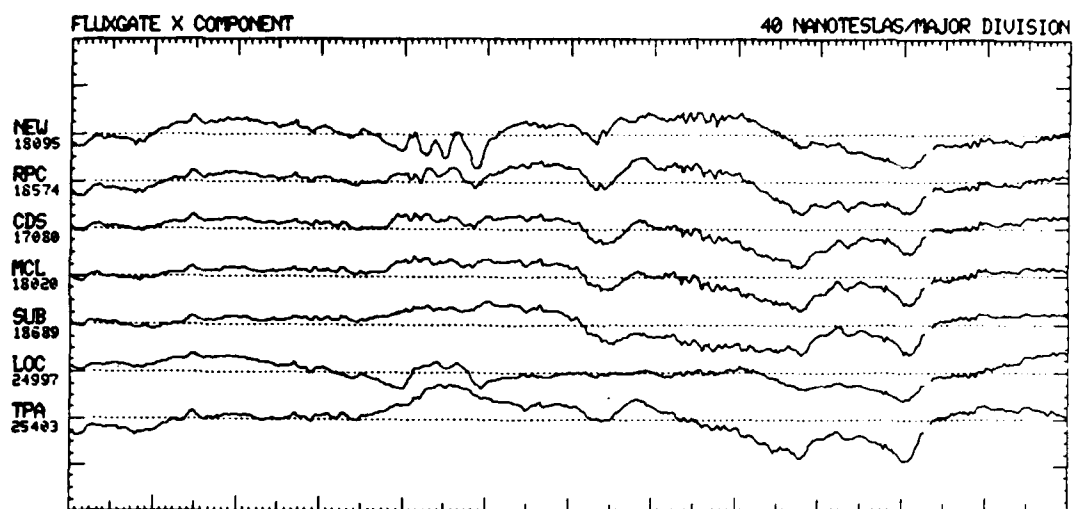


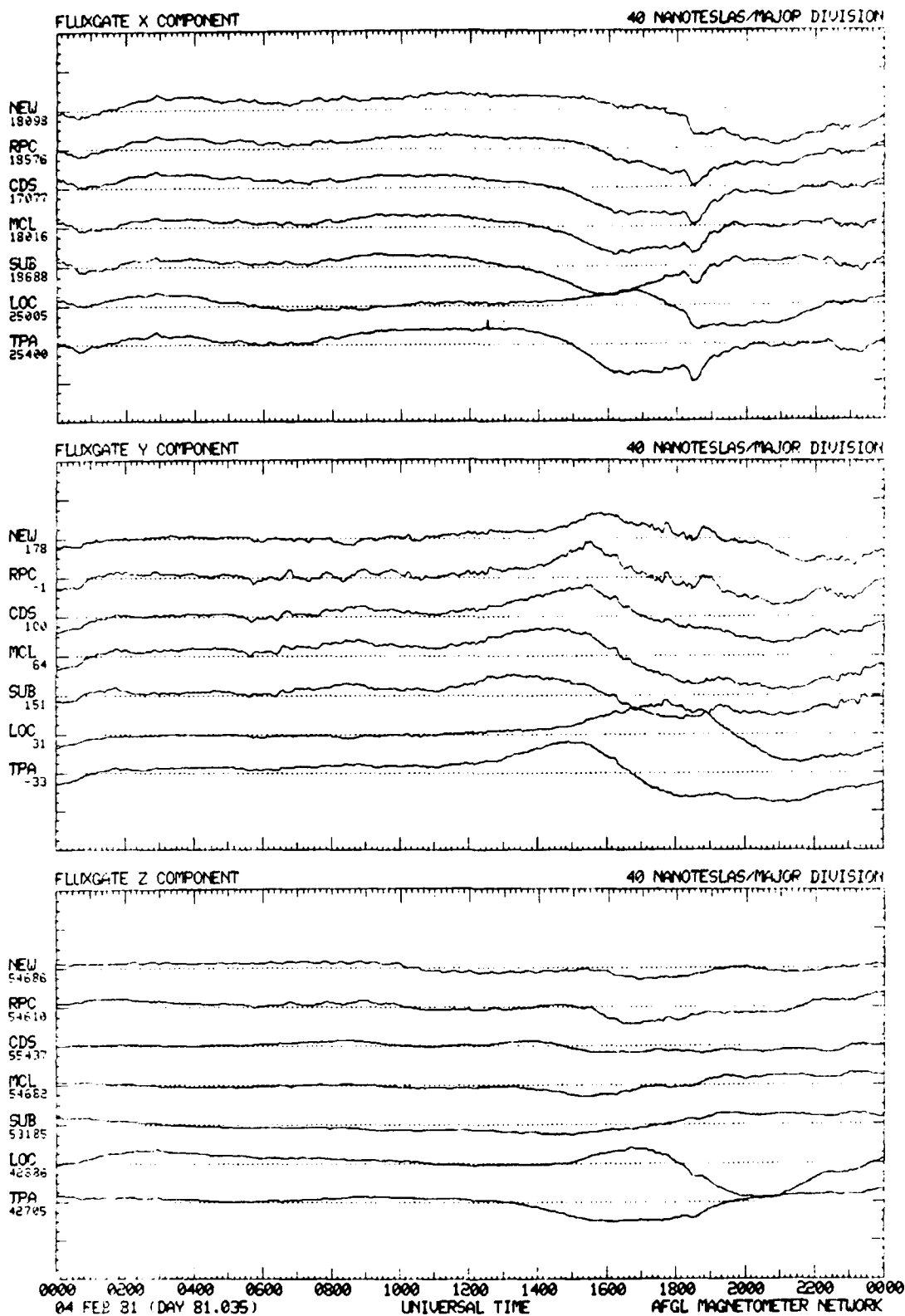


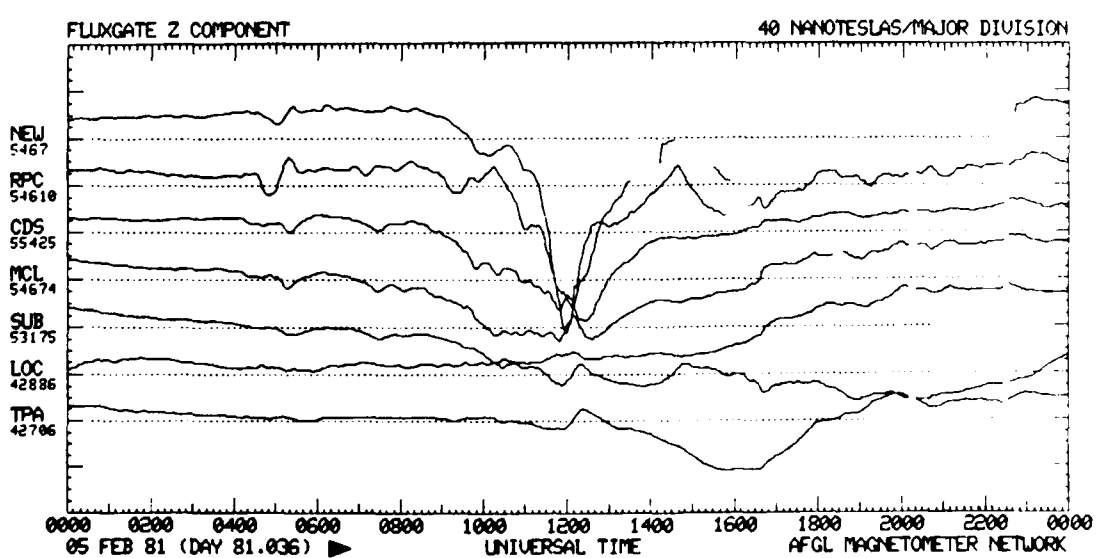
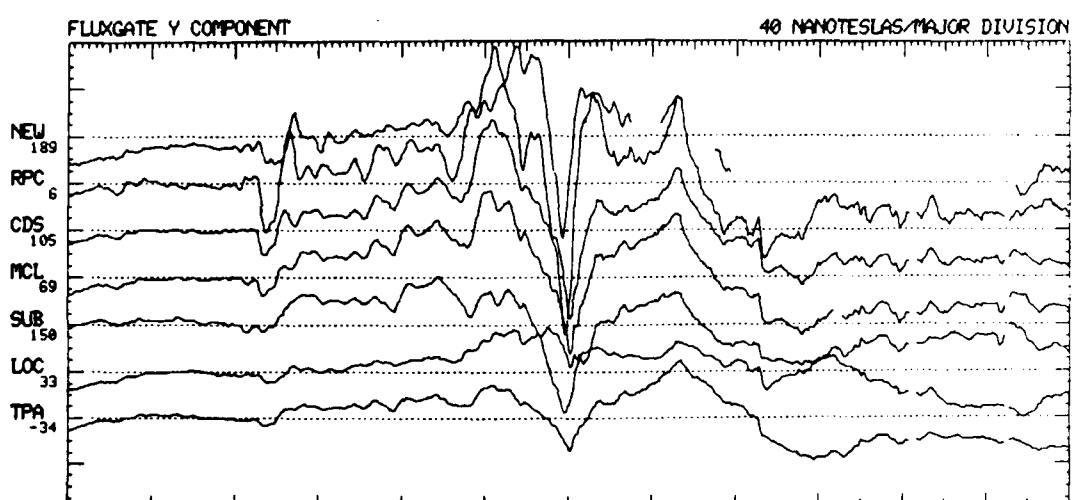
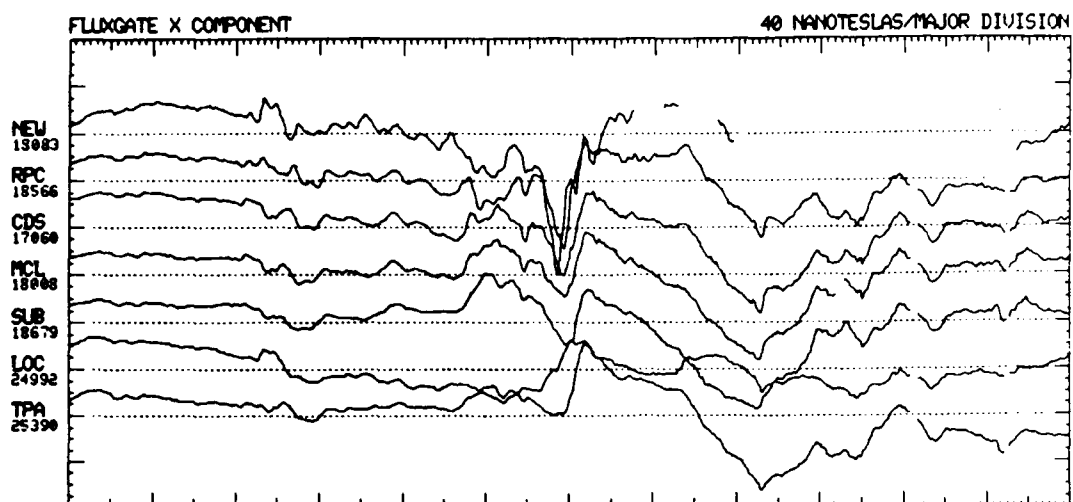




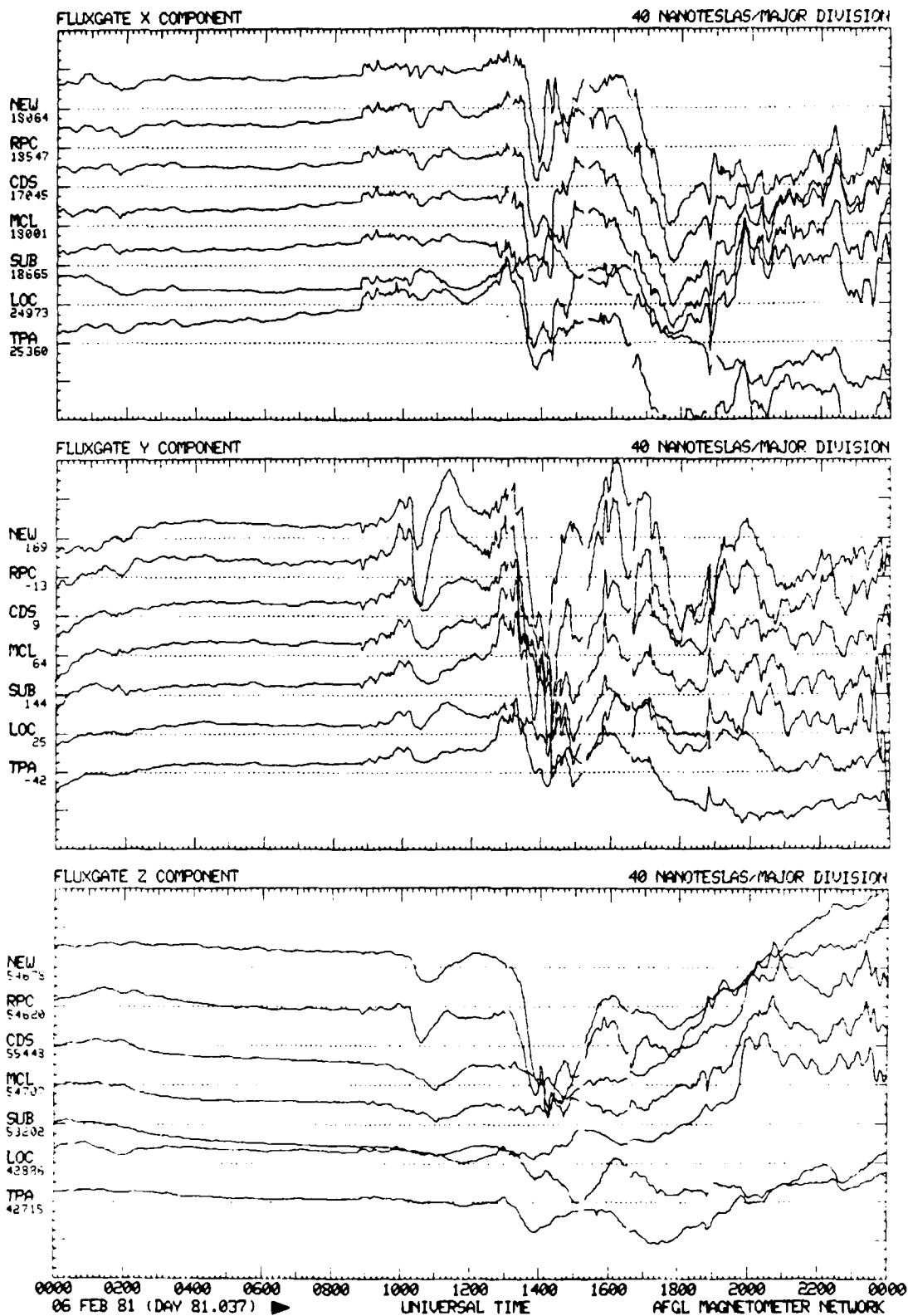


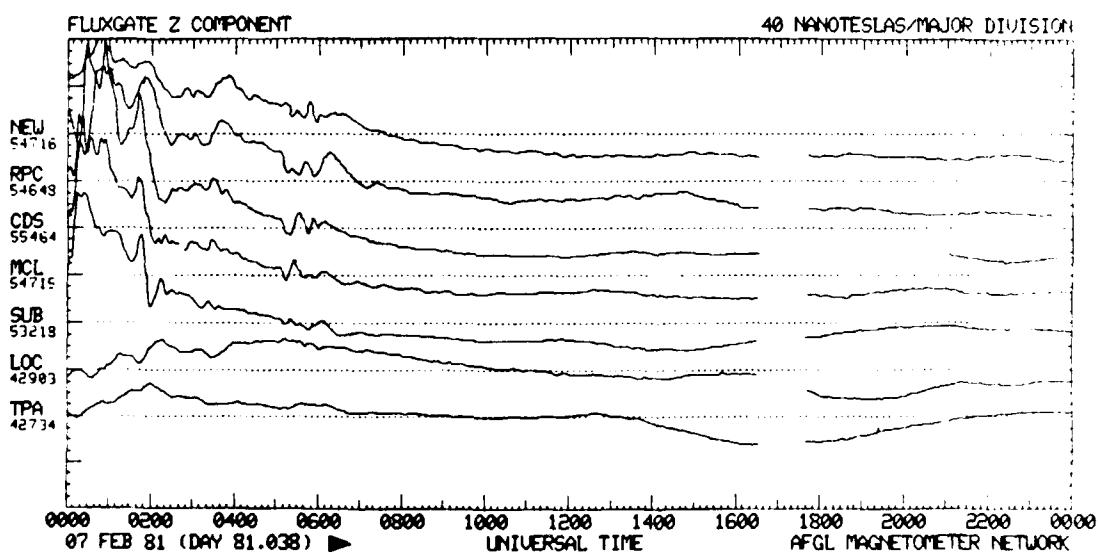
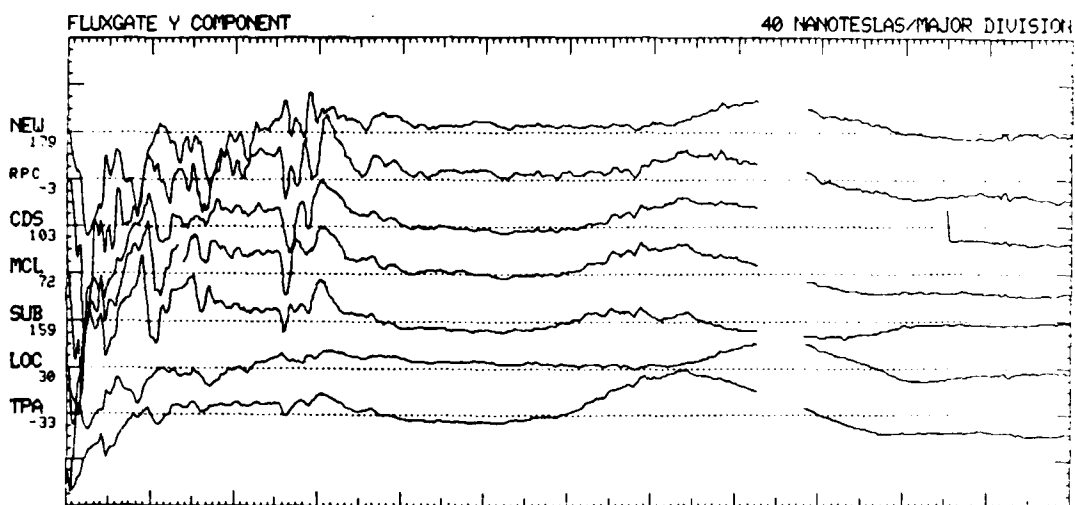
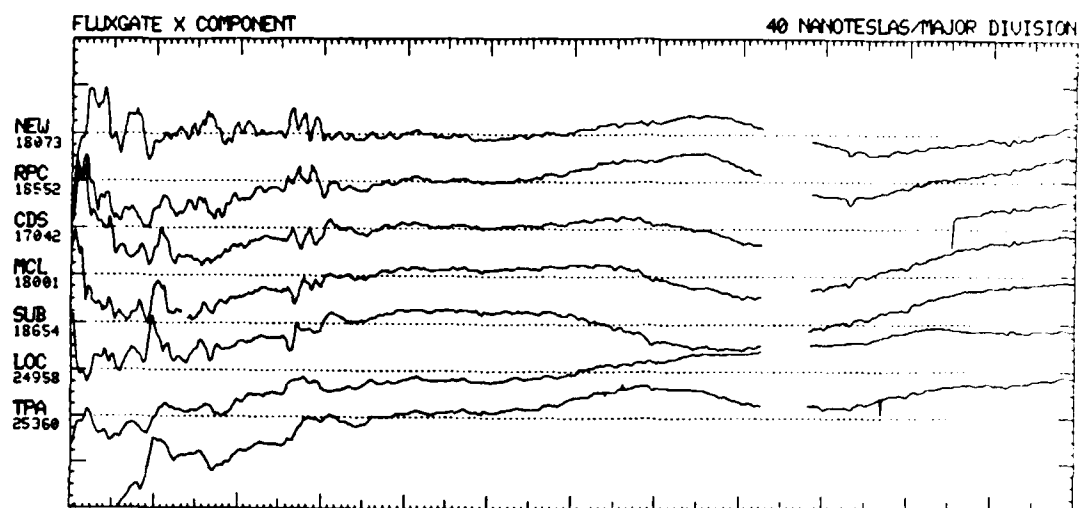




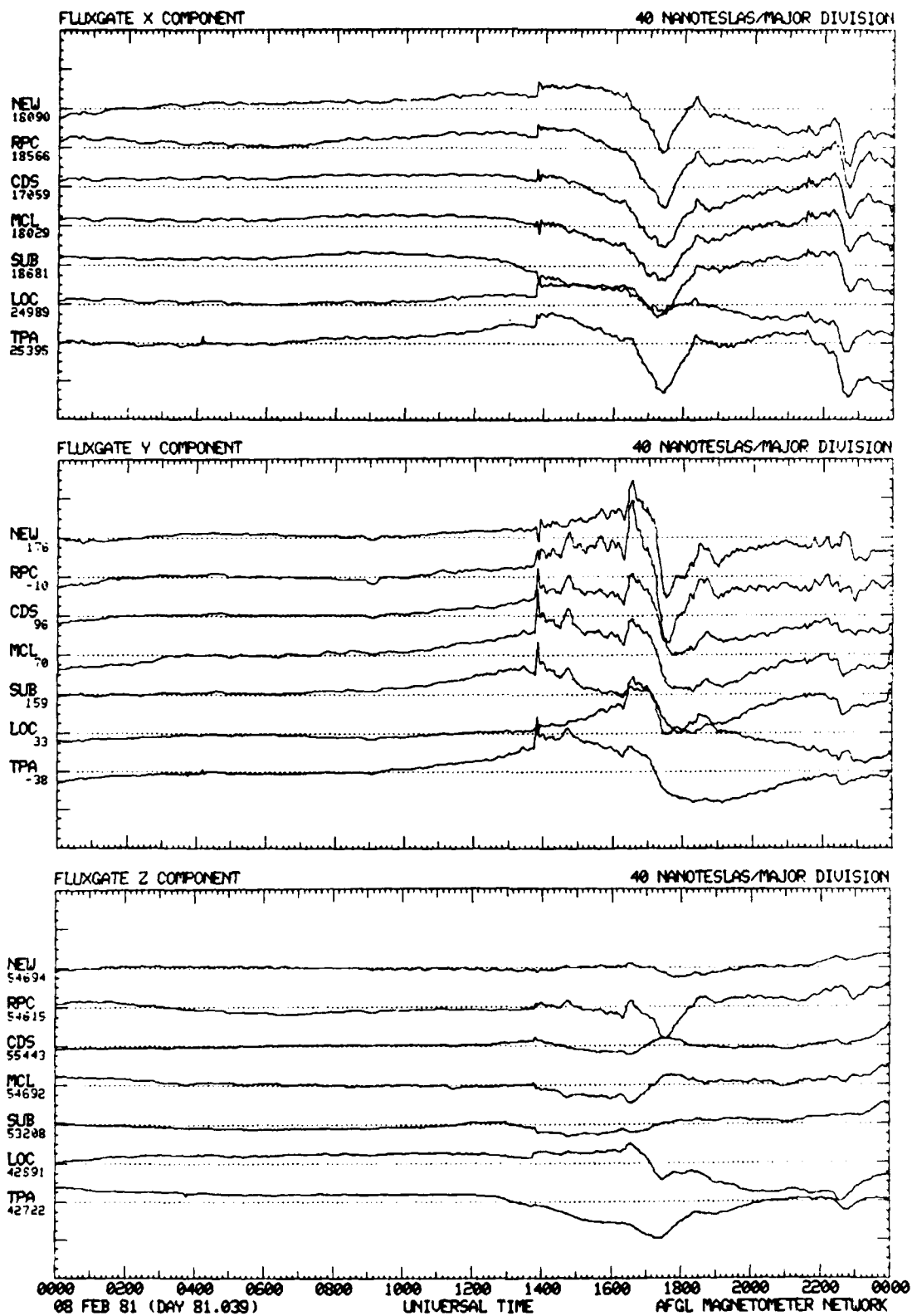


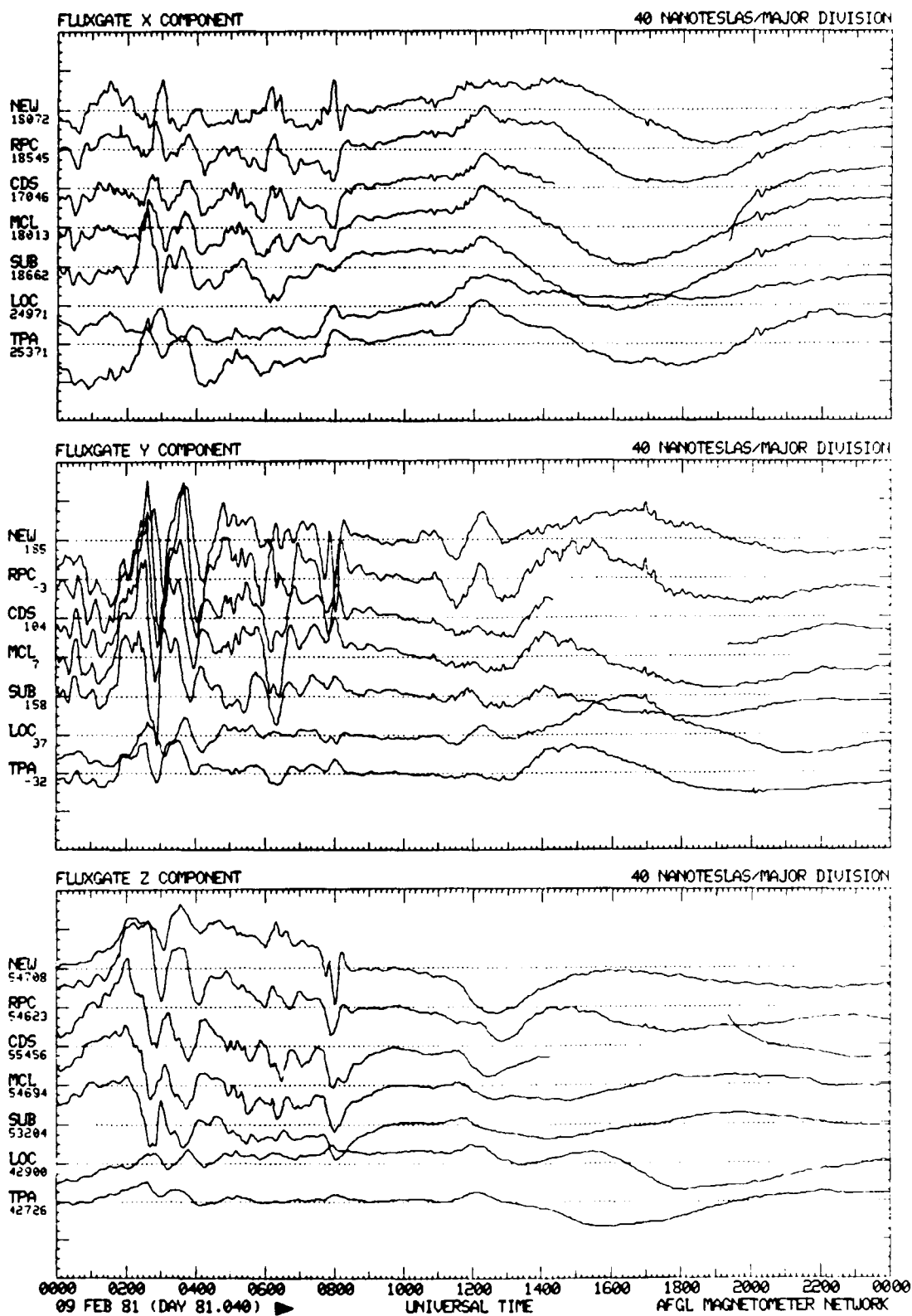
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05 FEB 81 (DAY 81.036) ► UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

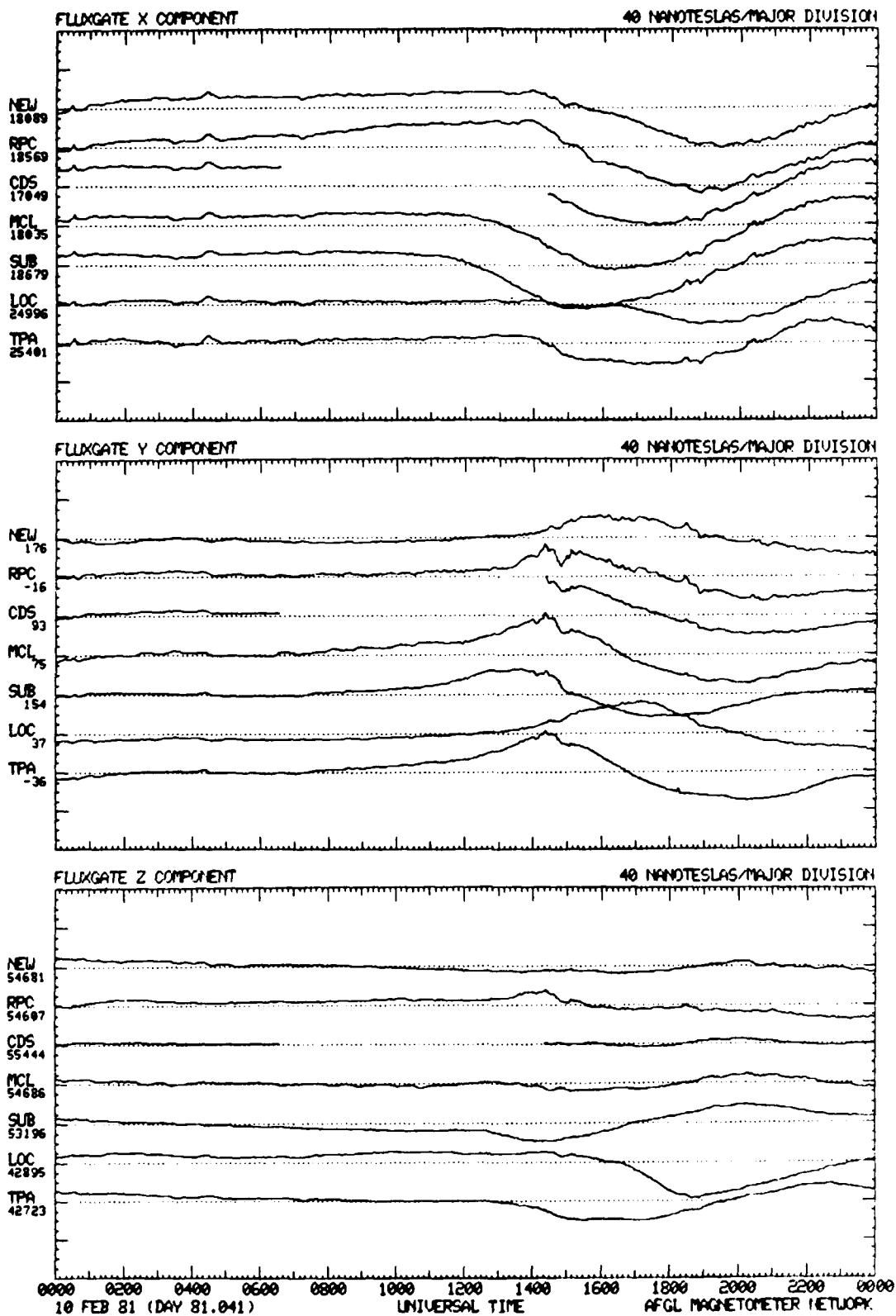


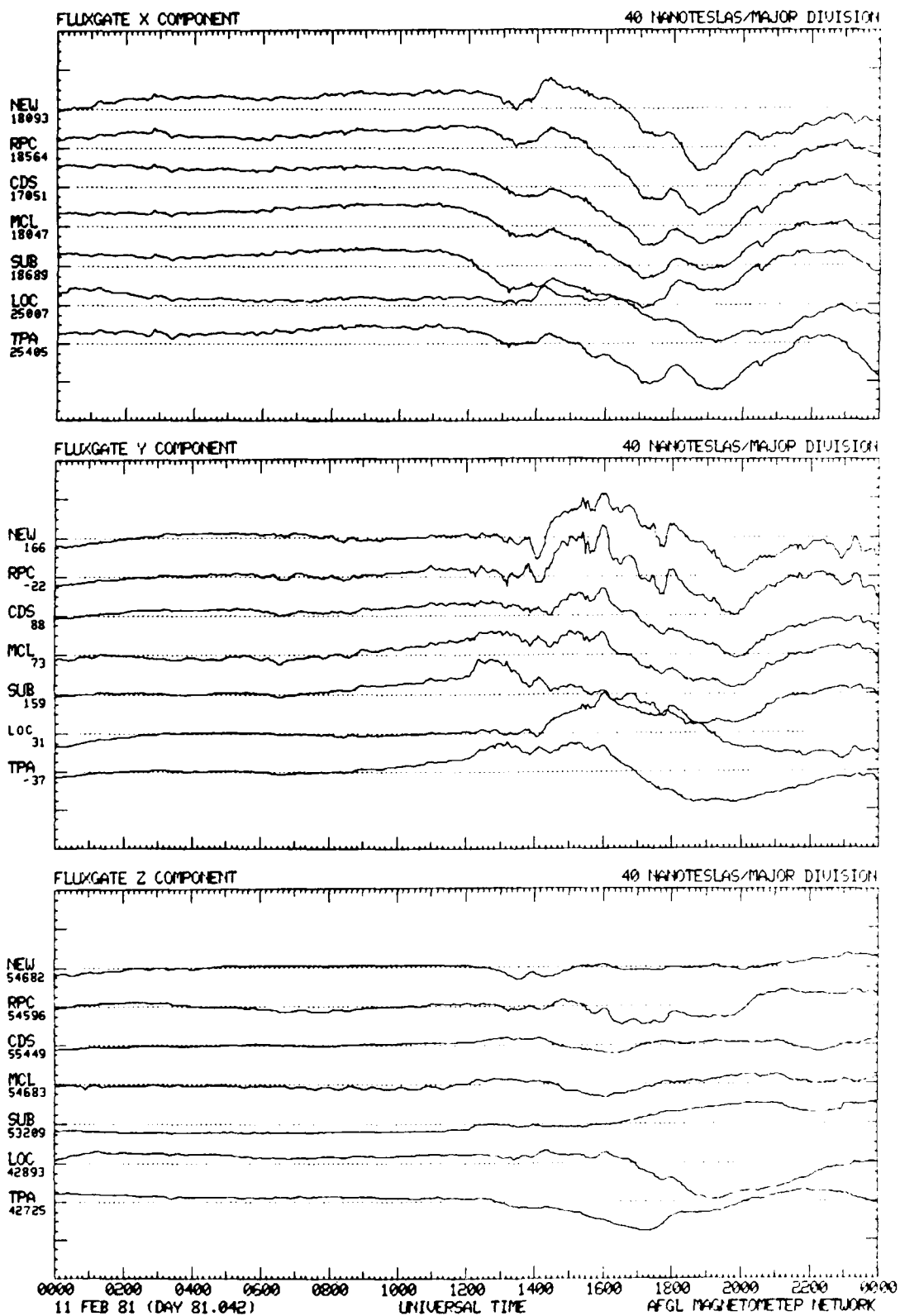




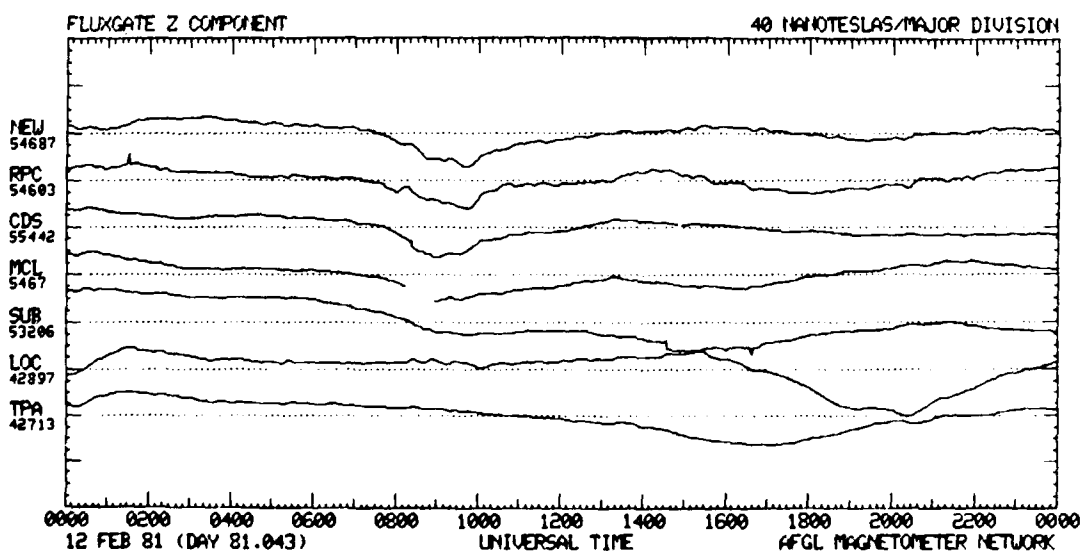
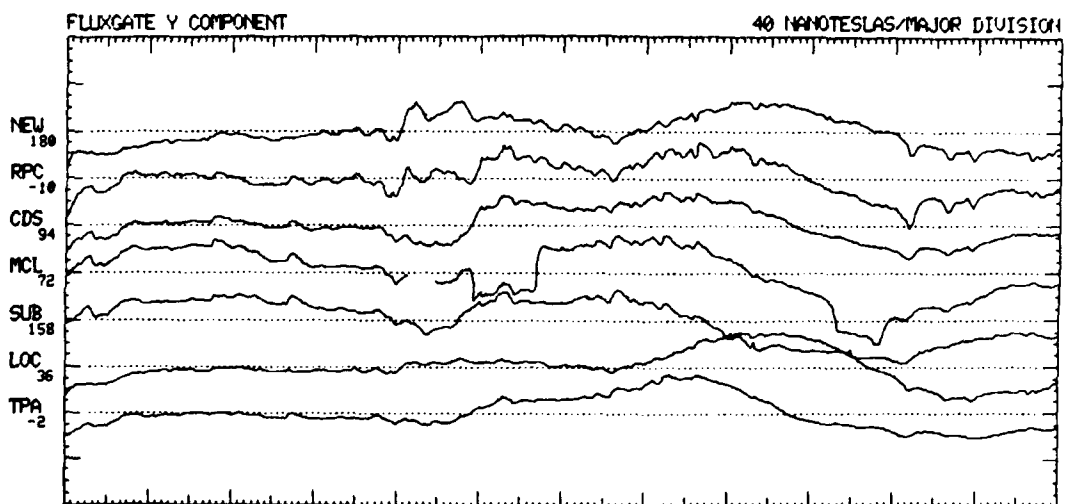
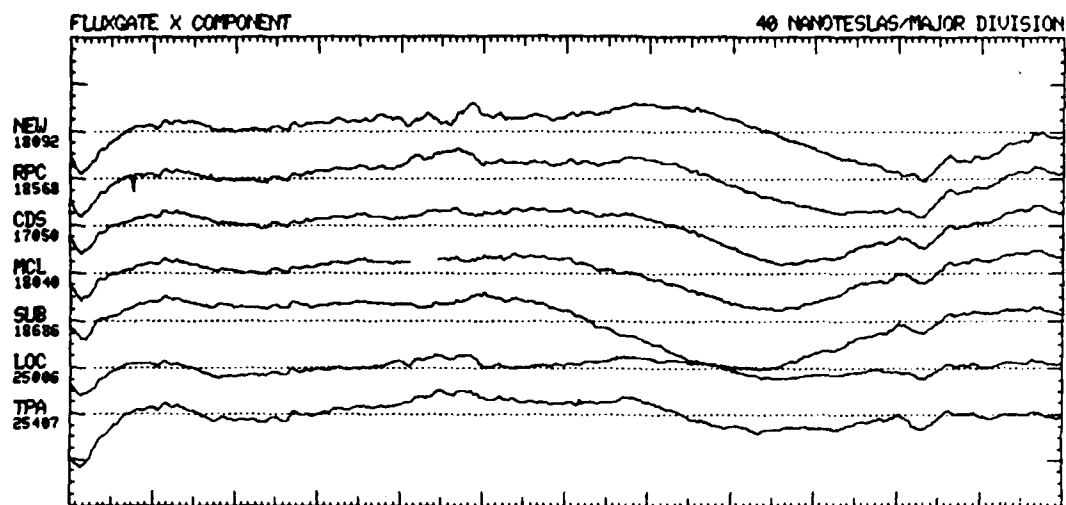


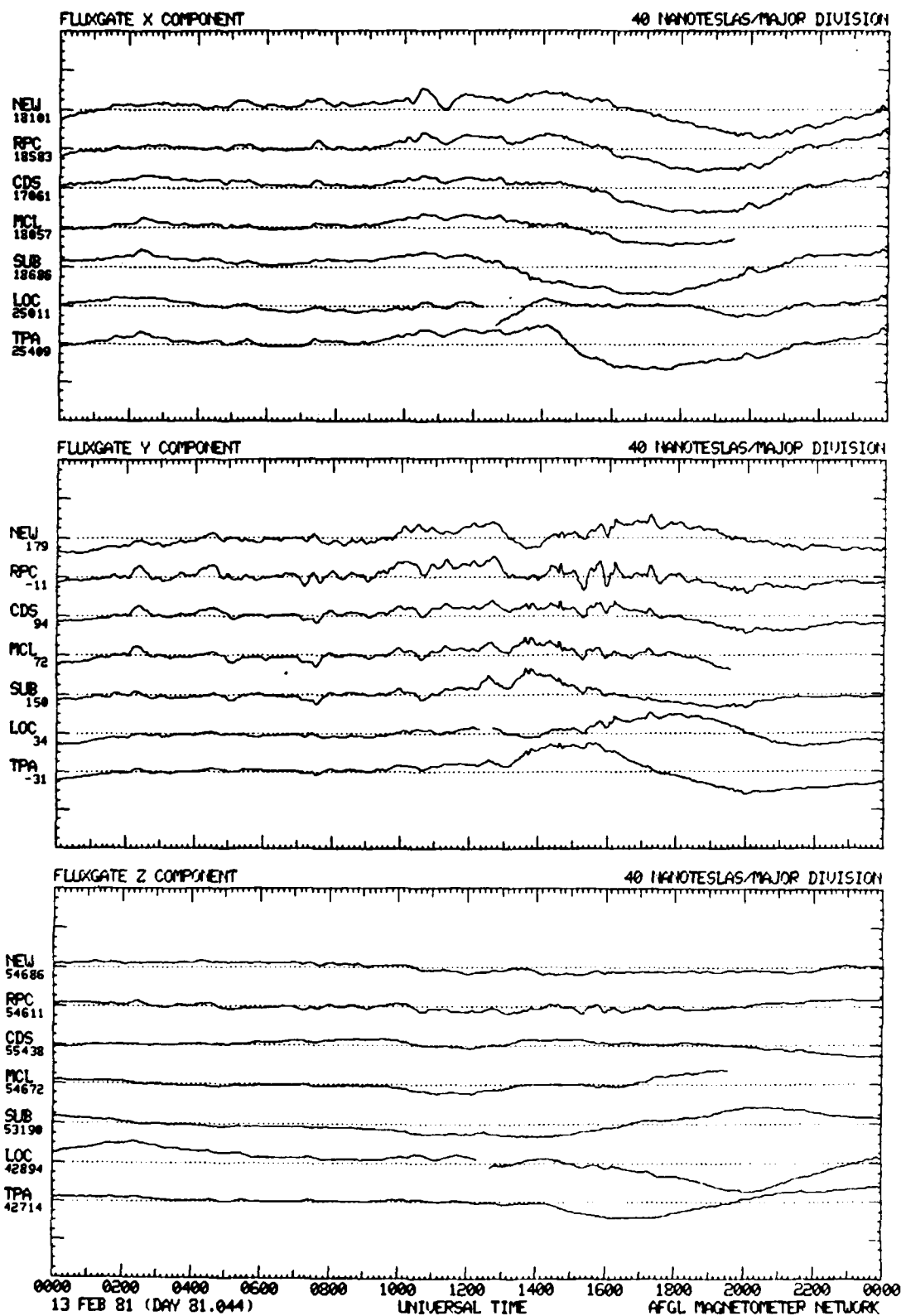


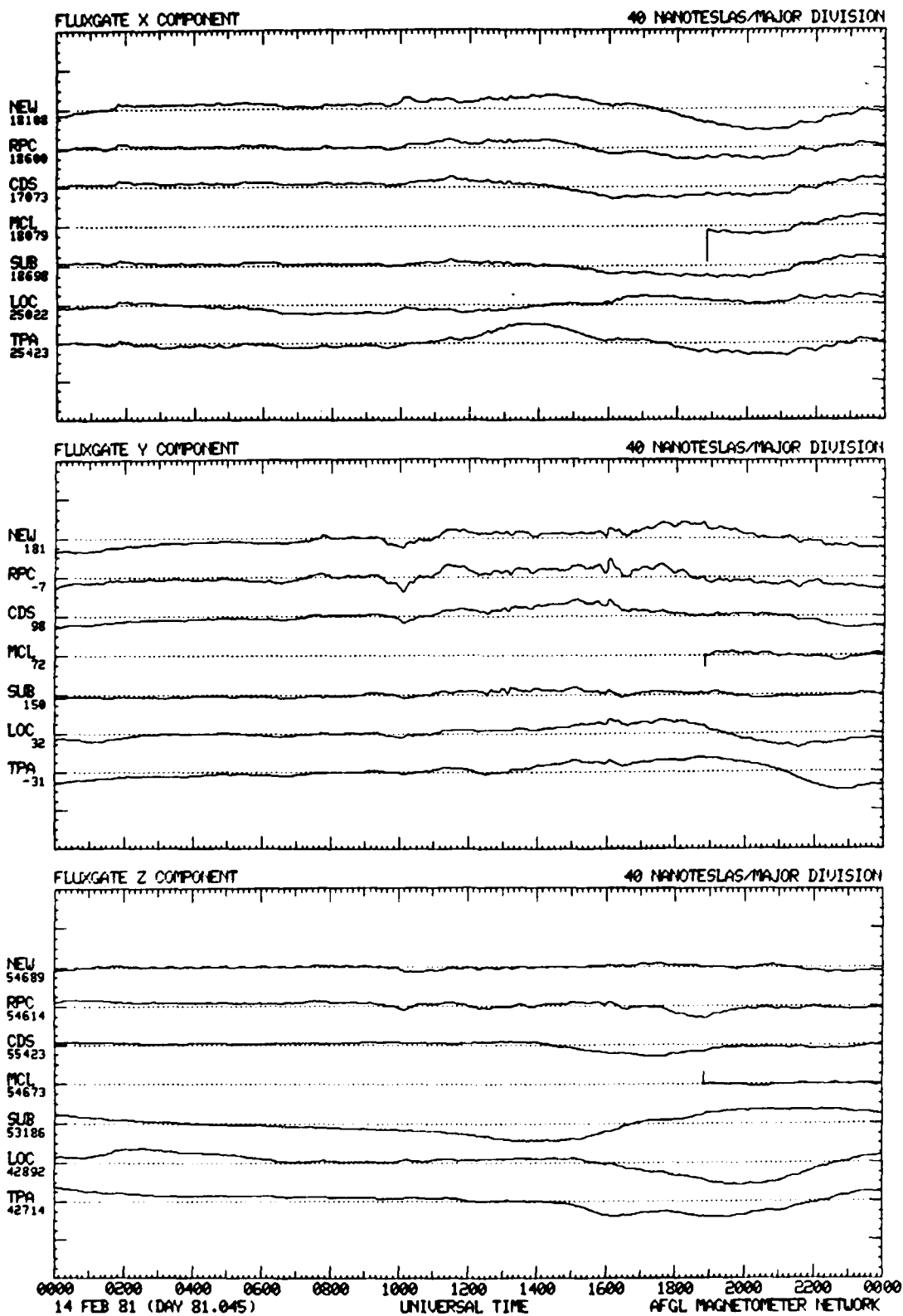


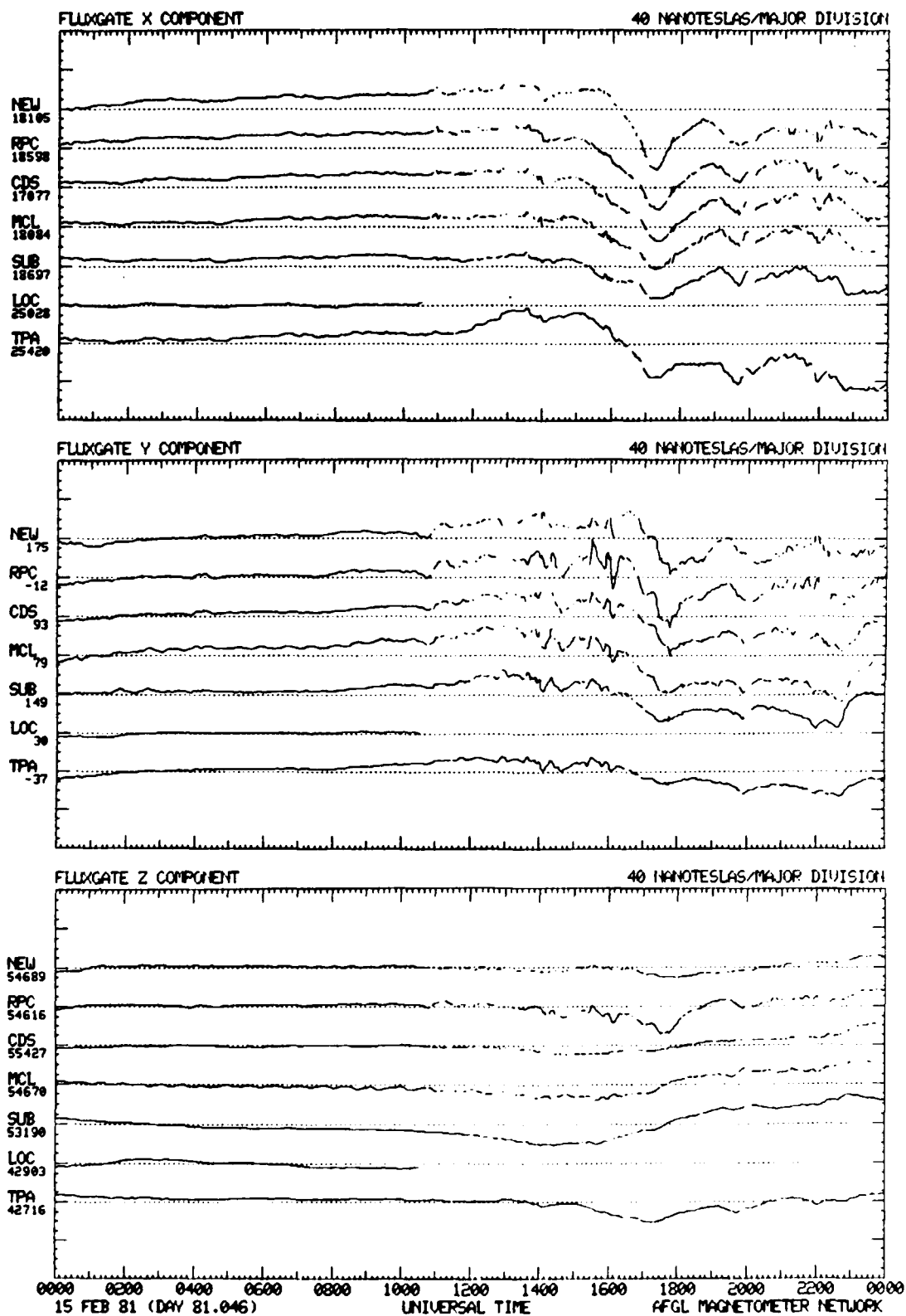


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 11 FEB 81 (DAY 81.042) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

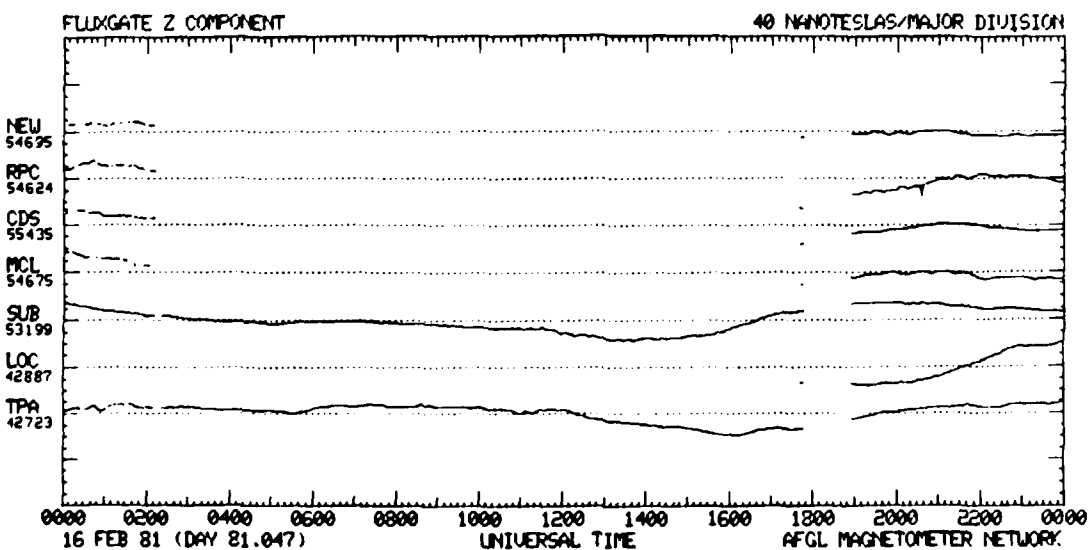
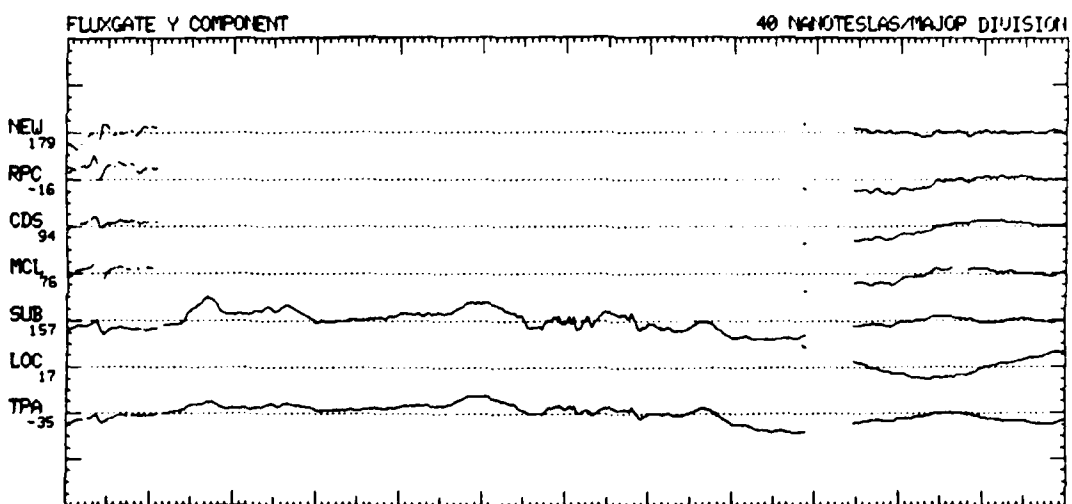
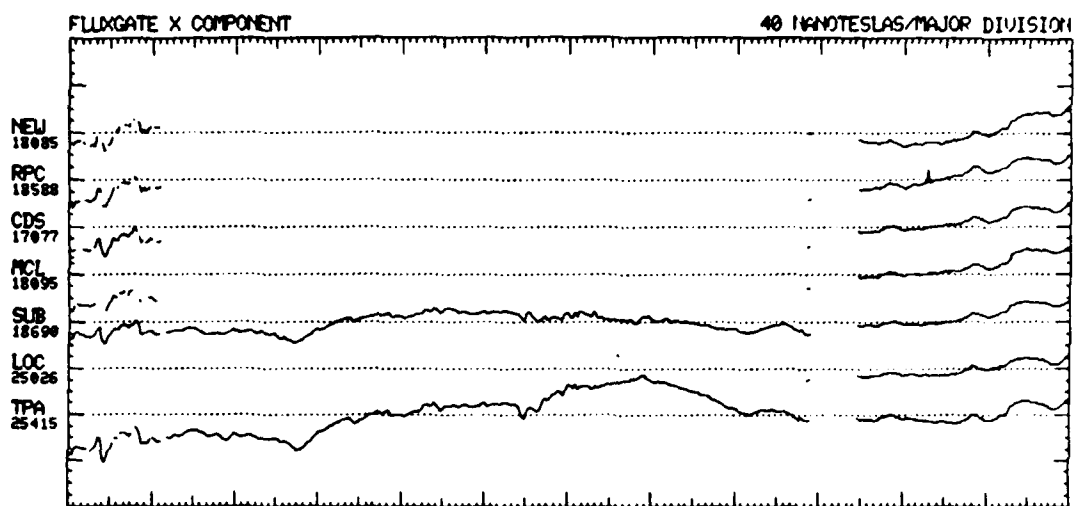


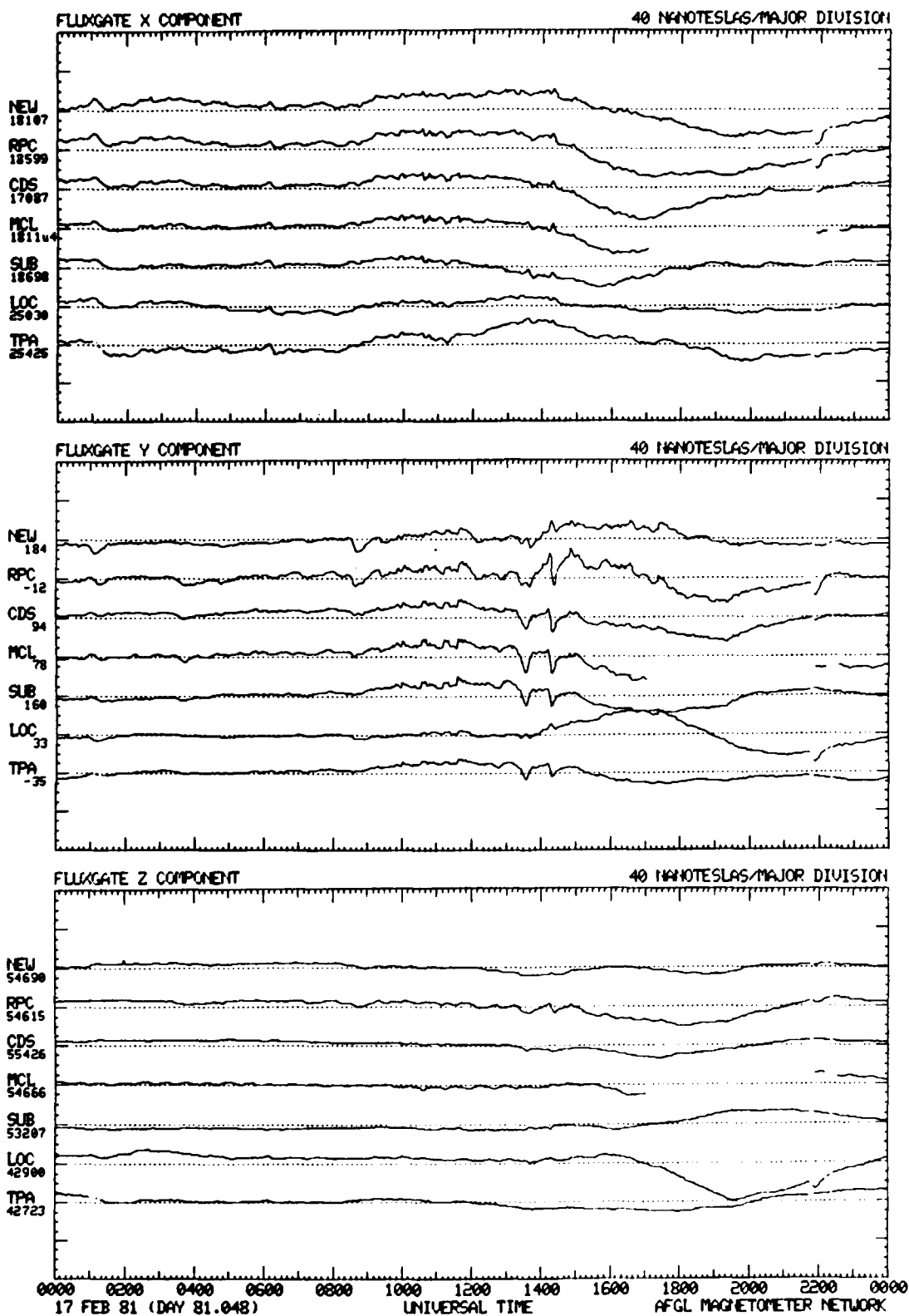


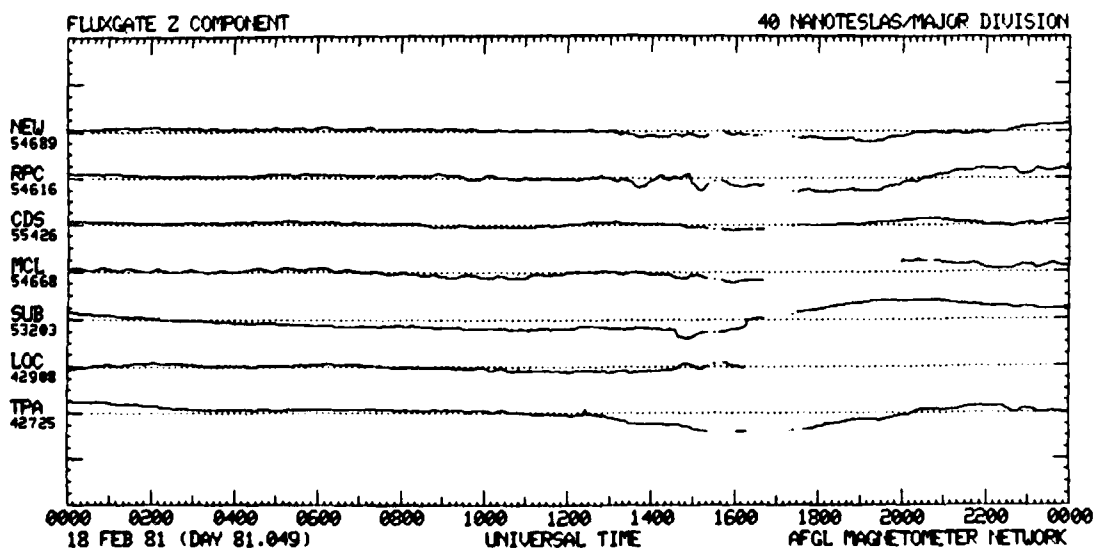
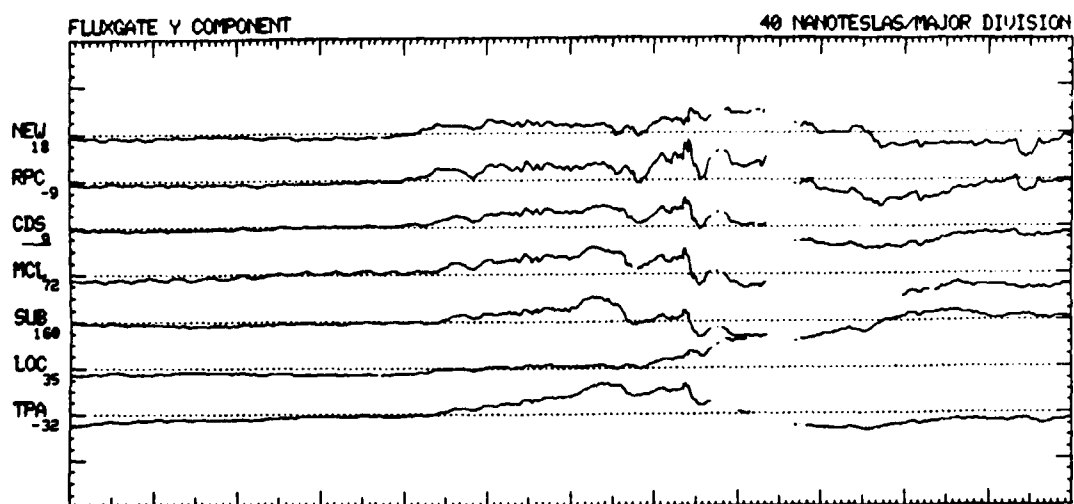
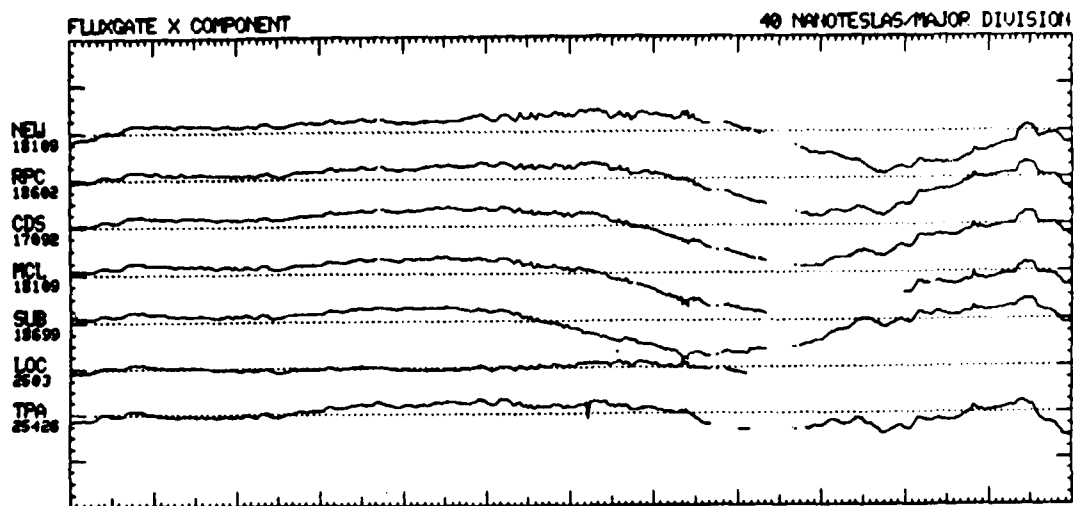








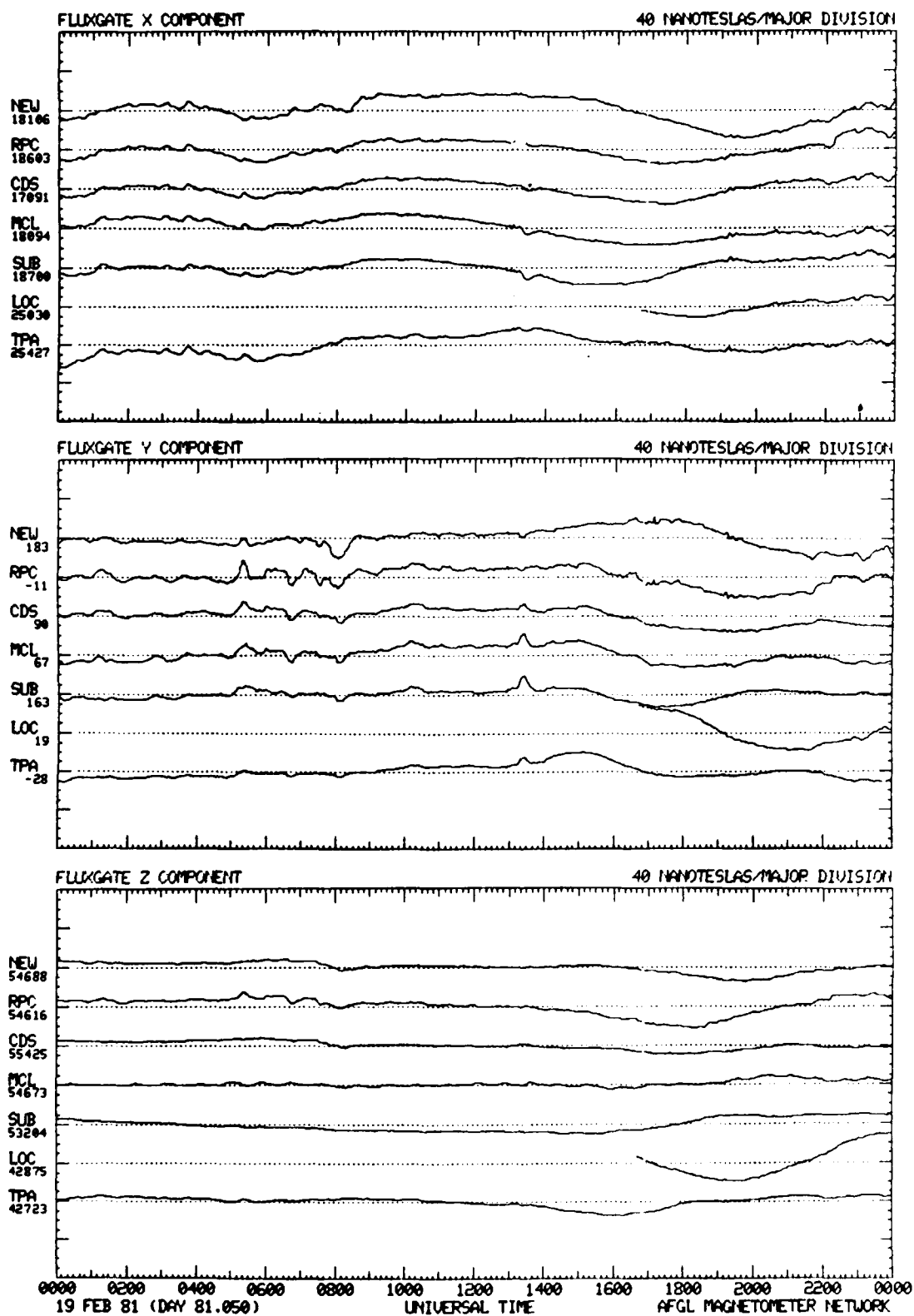


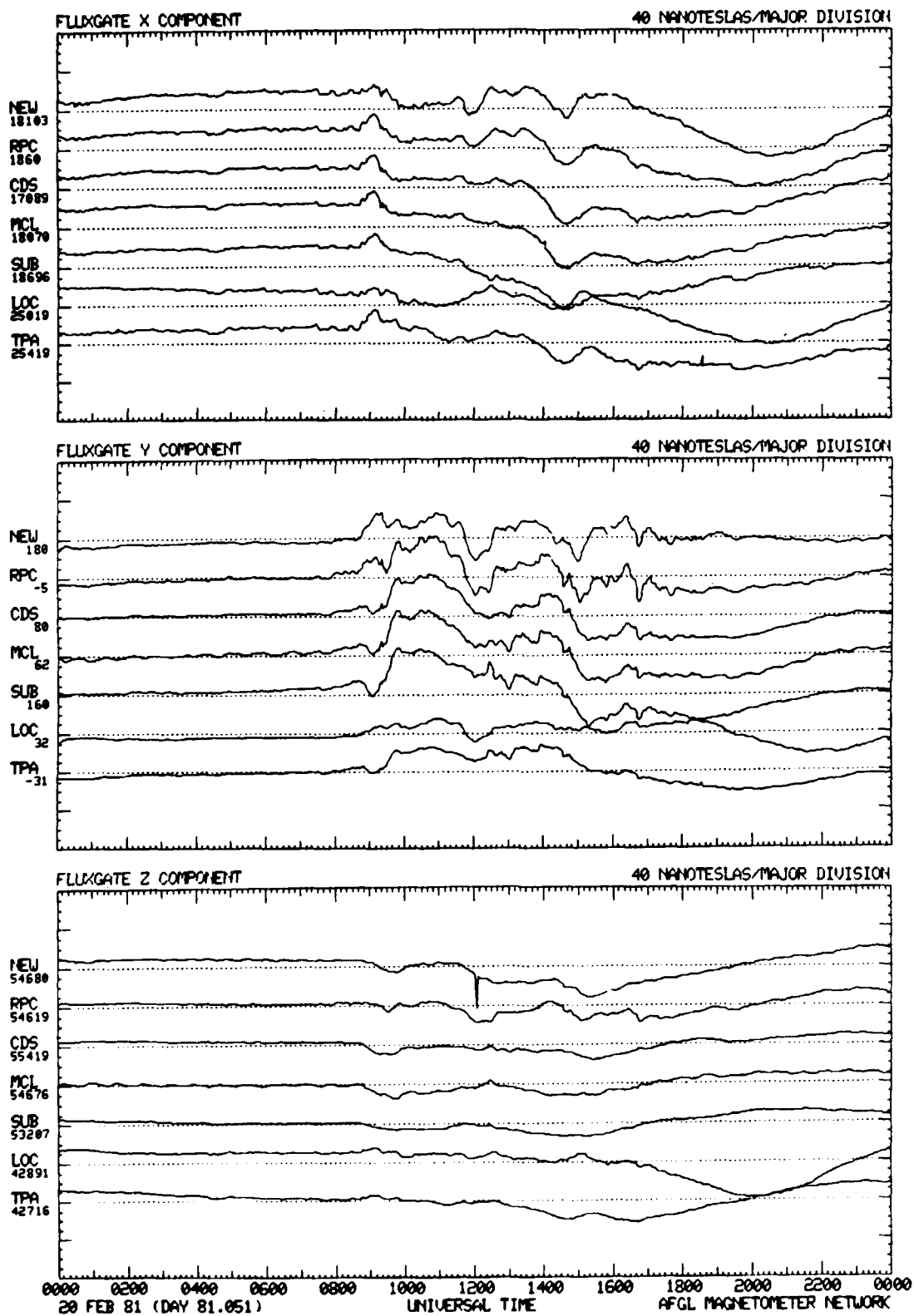


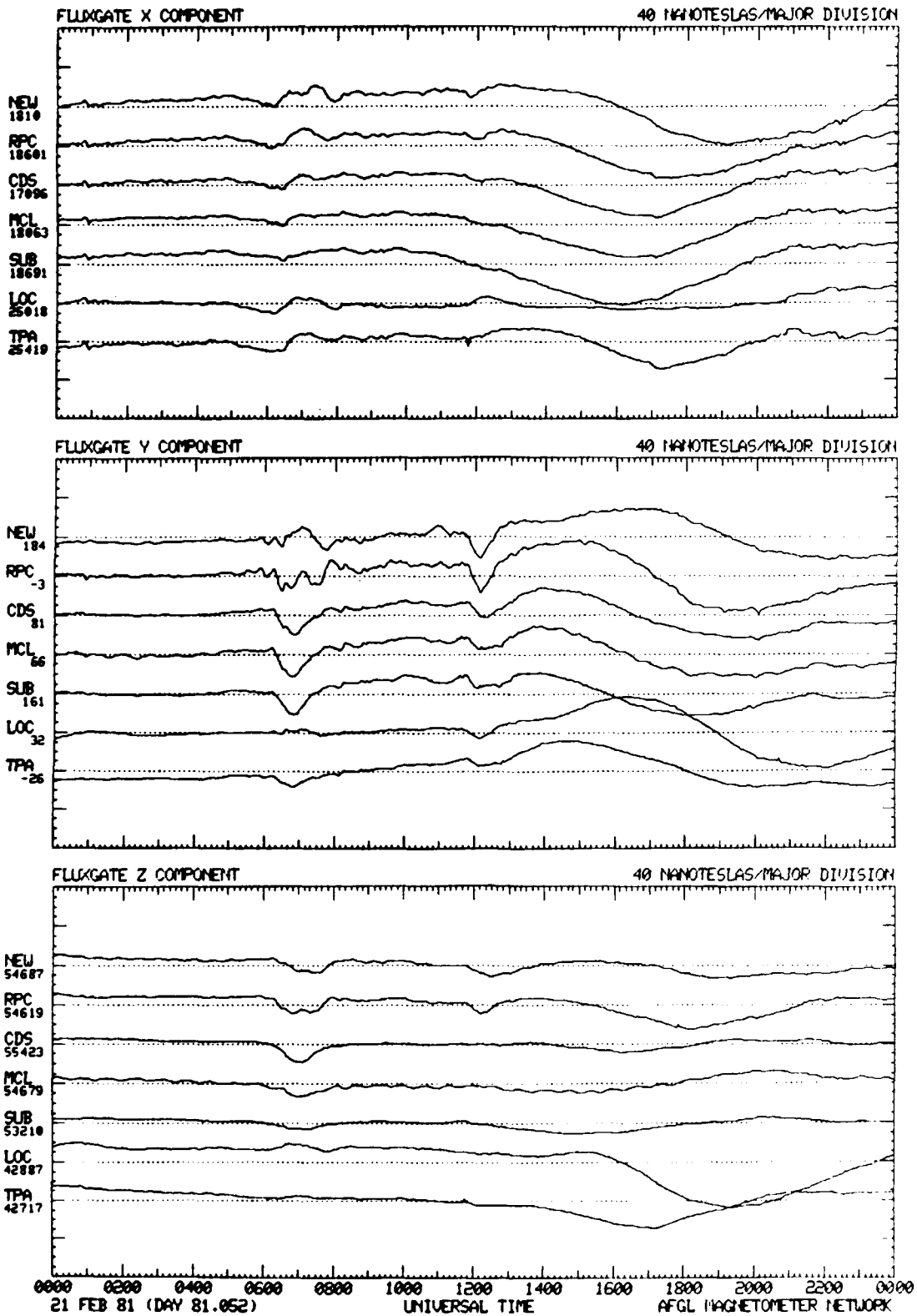
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18 FEB 81 (DAY 81.049)

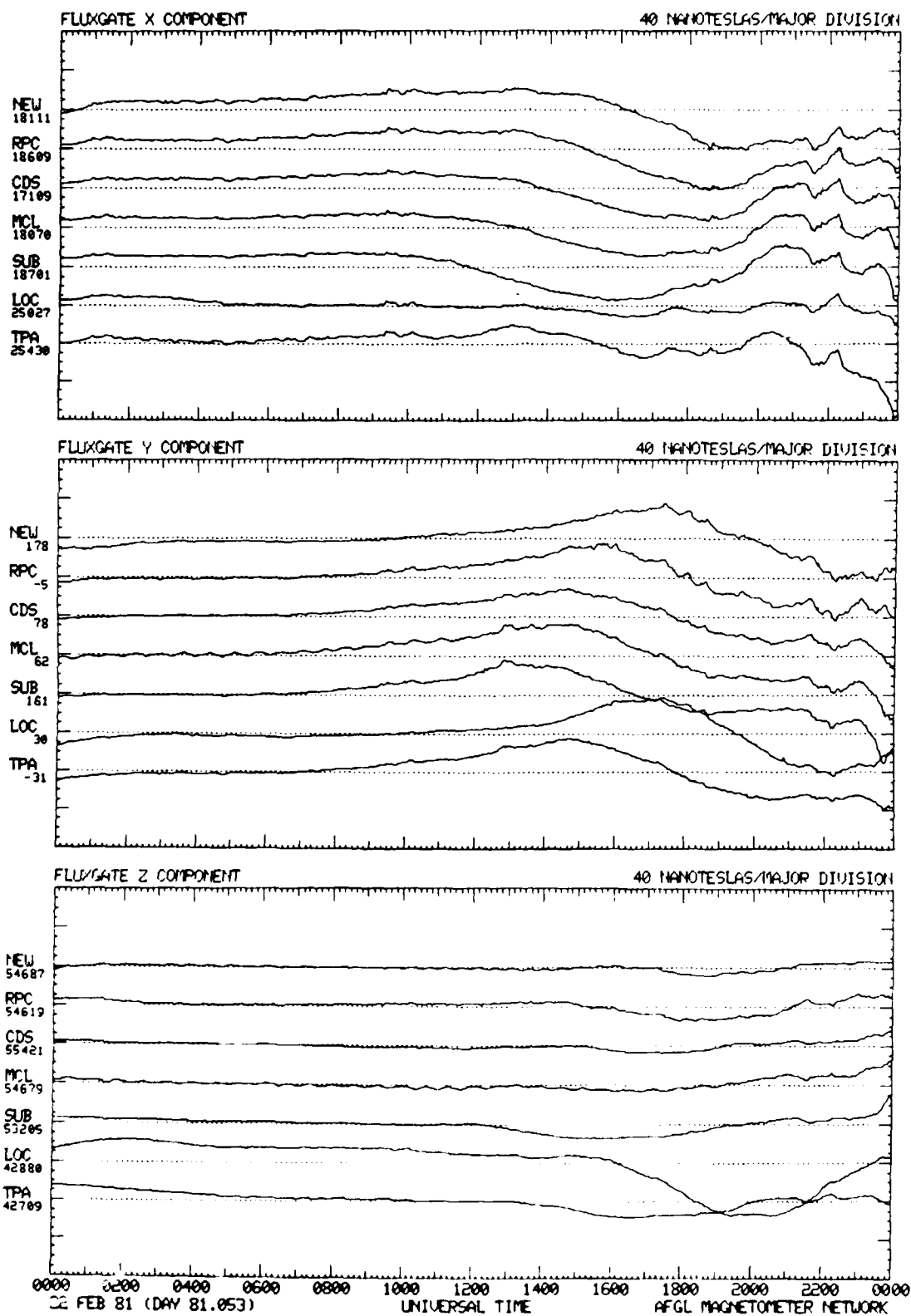
UNIVERSAL TIME

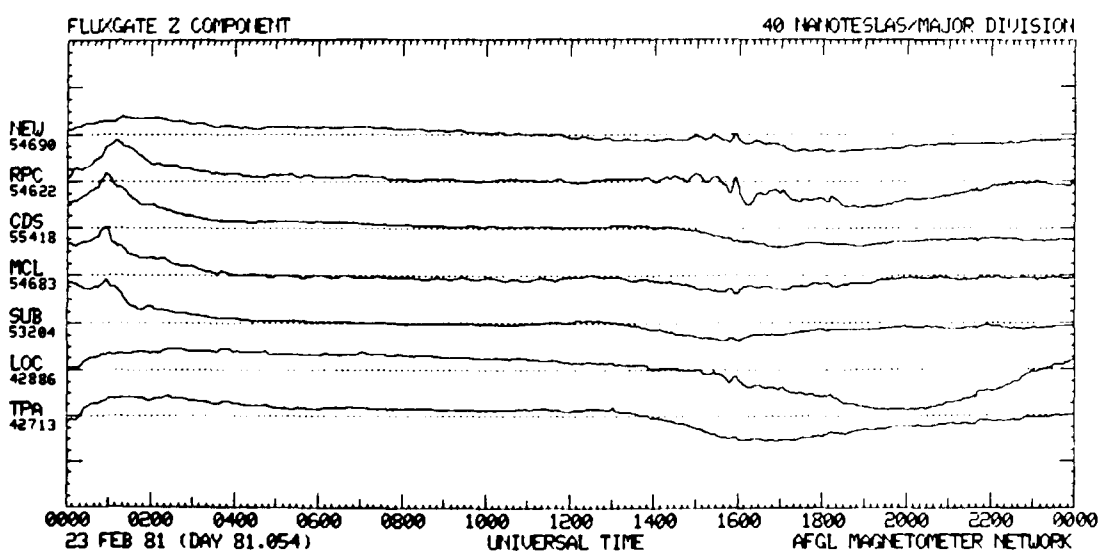
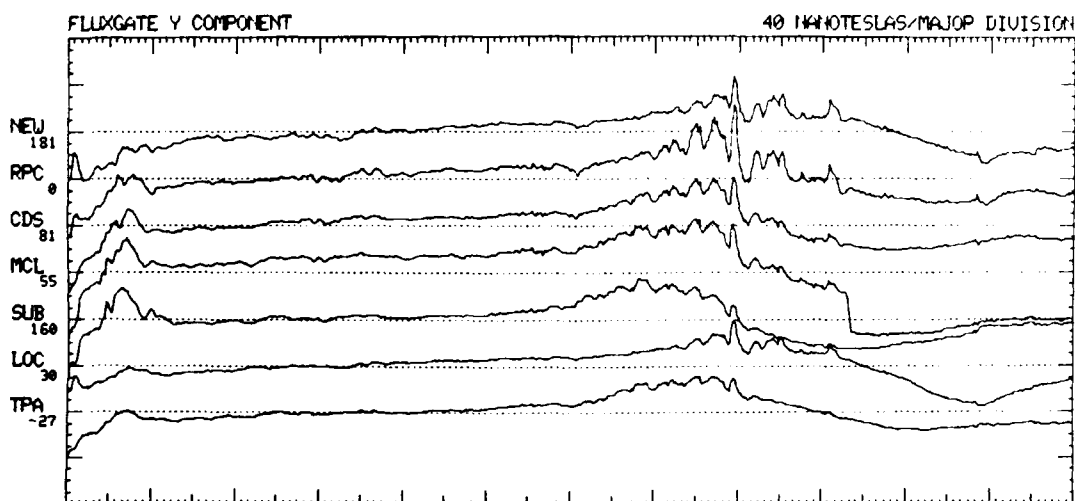
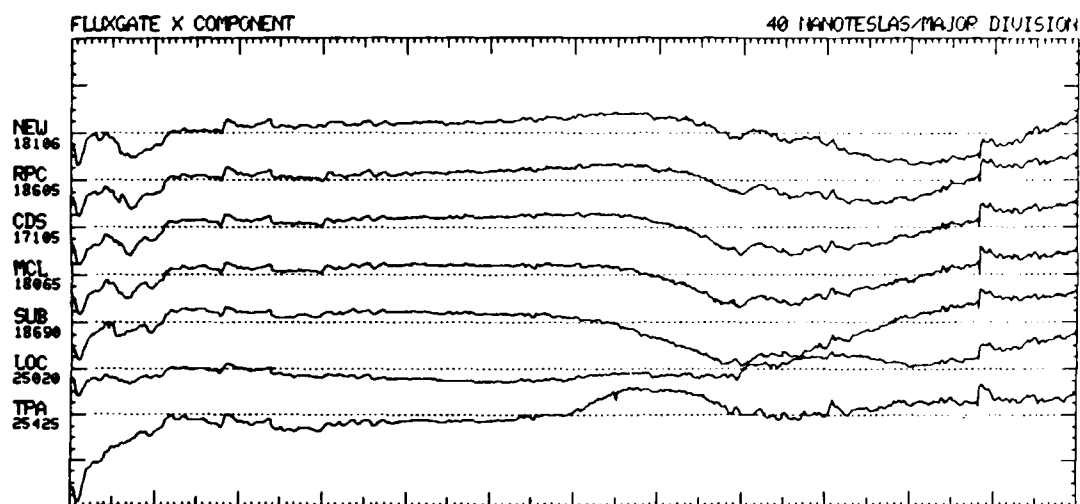
AFGL MAGNETOMETER NETWORK



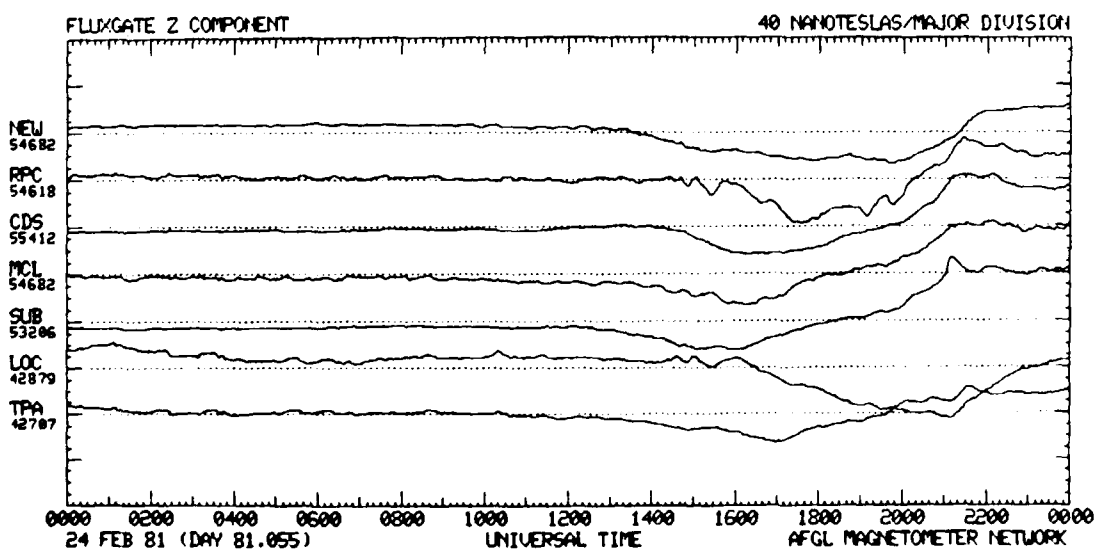
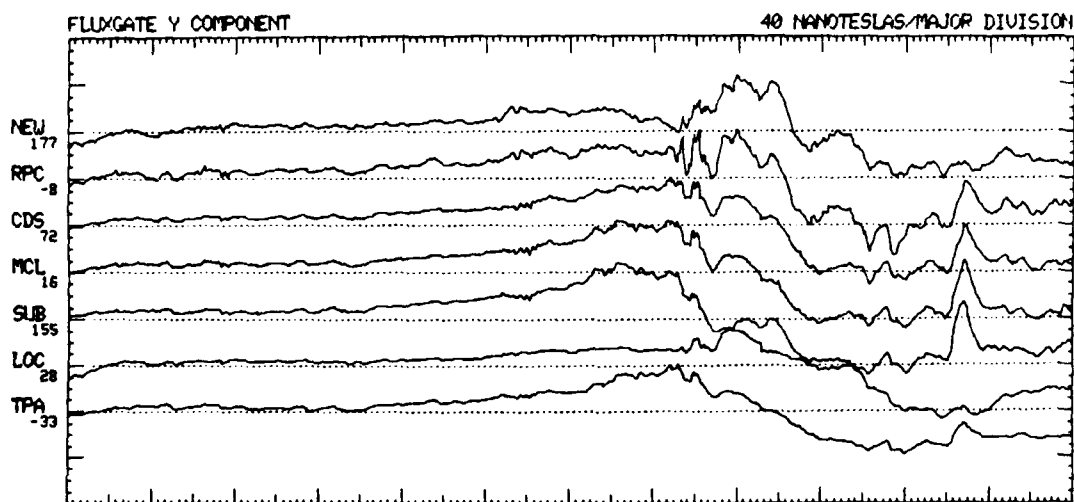
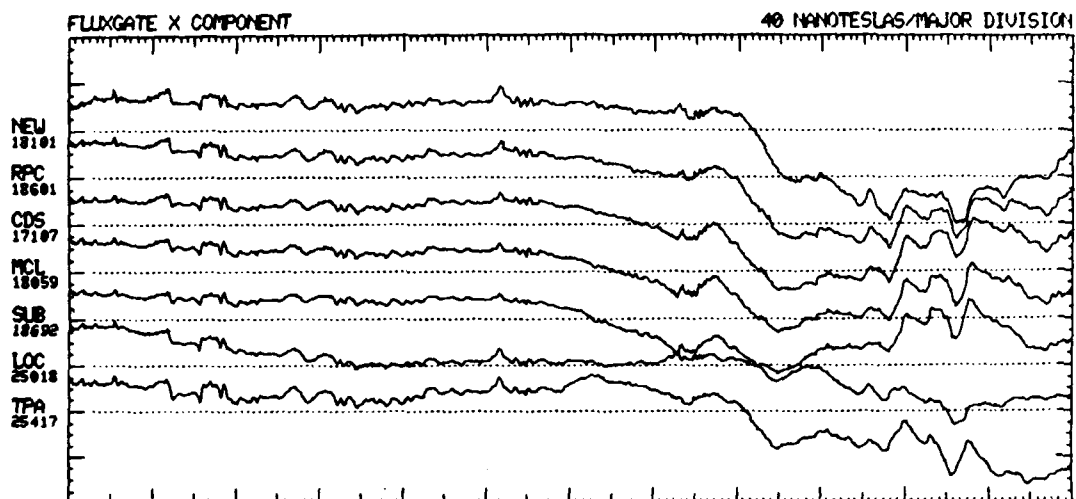


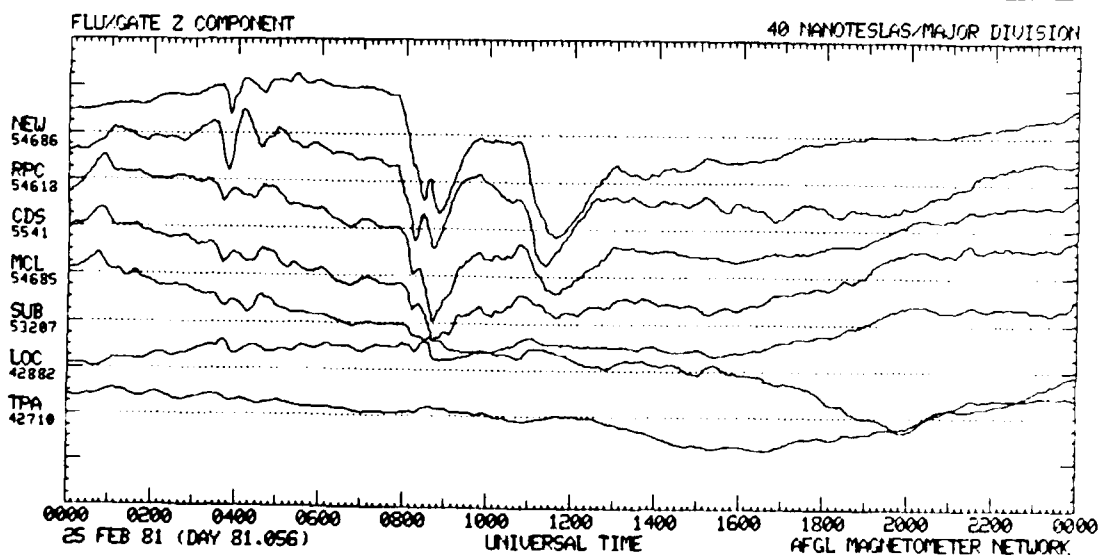
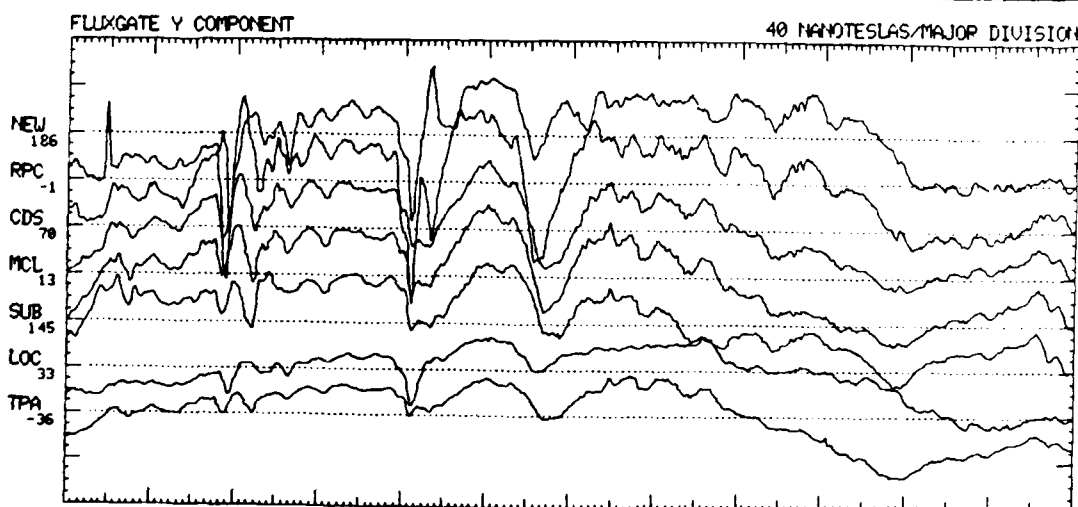
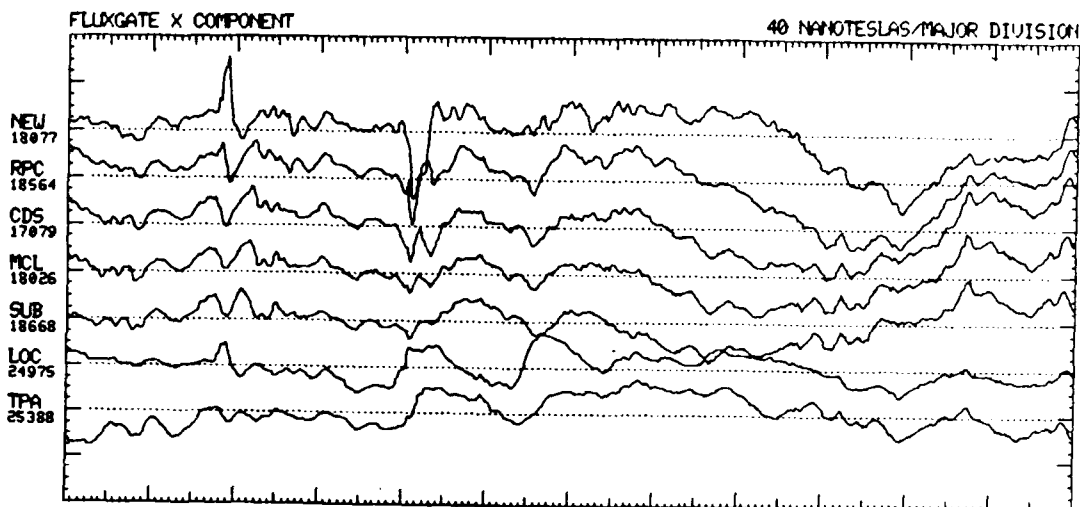


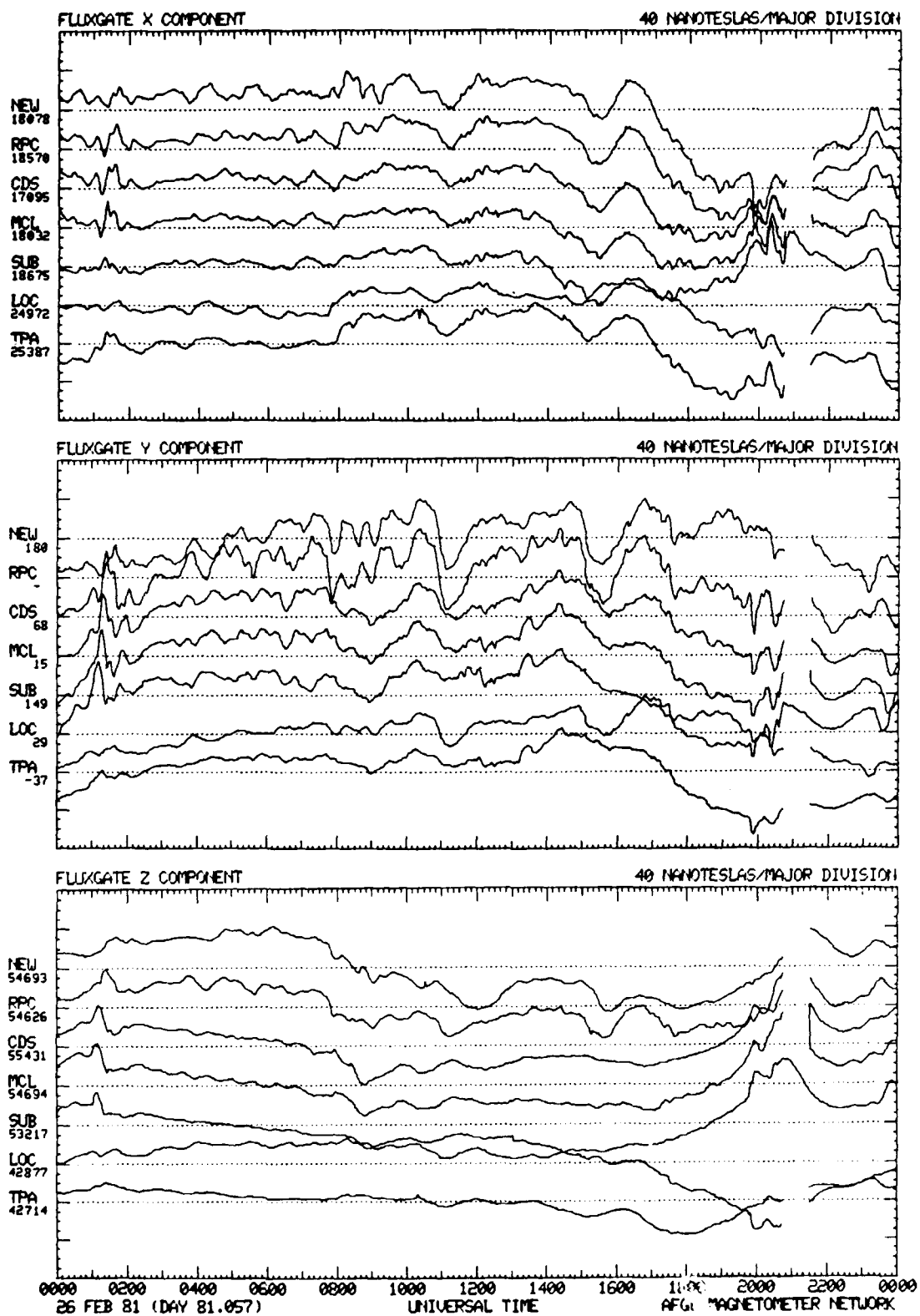


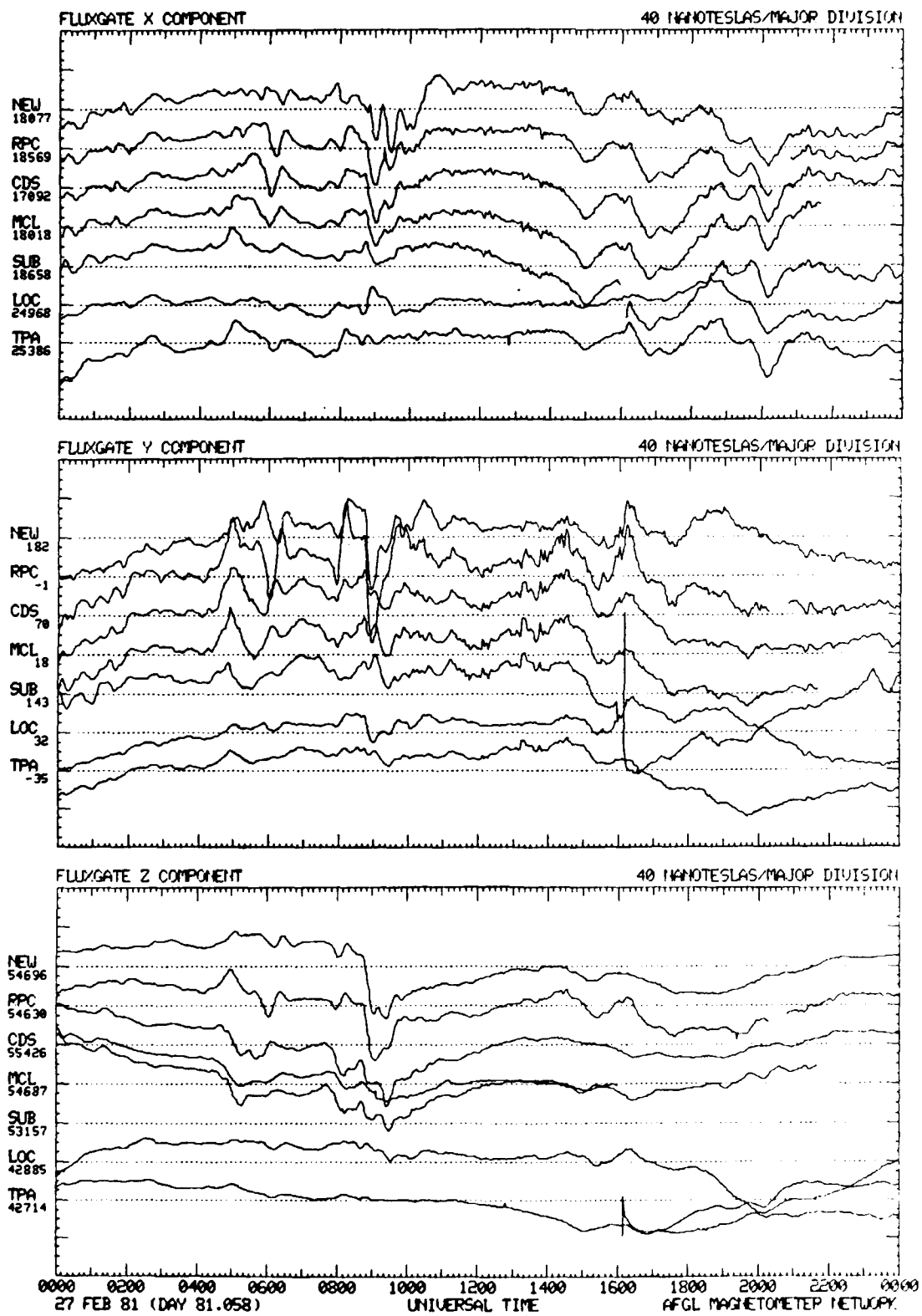


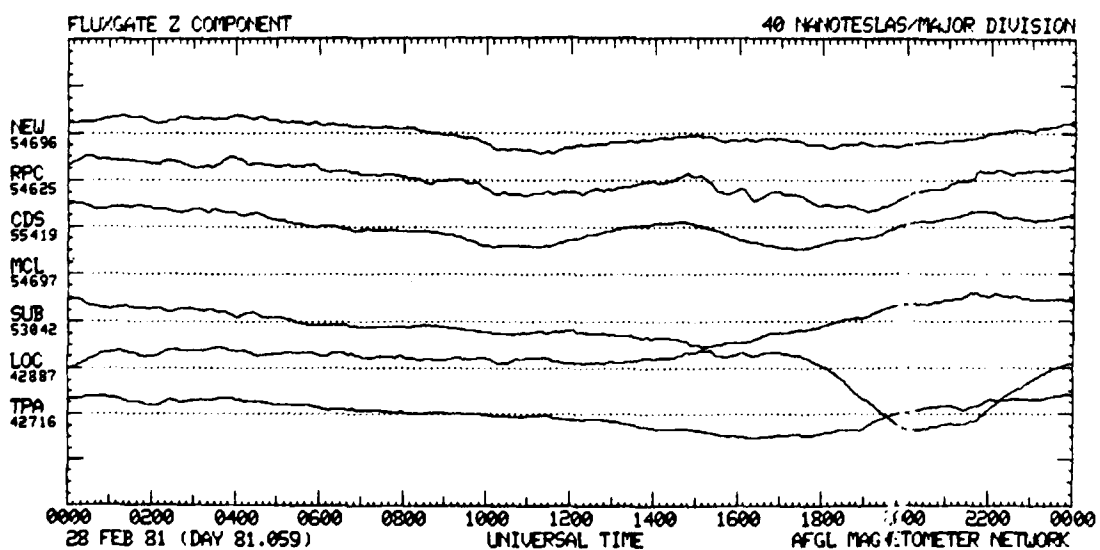
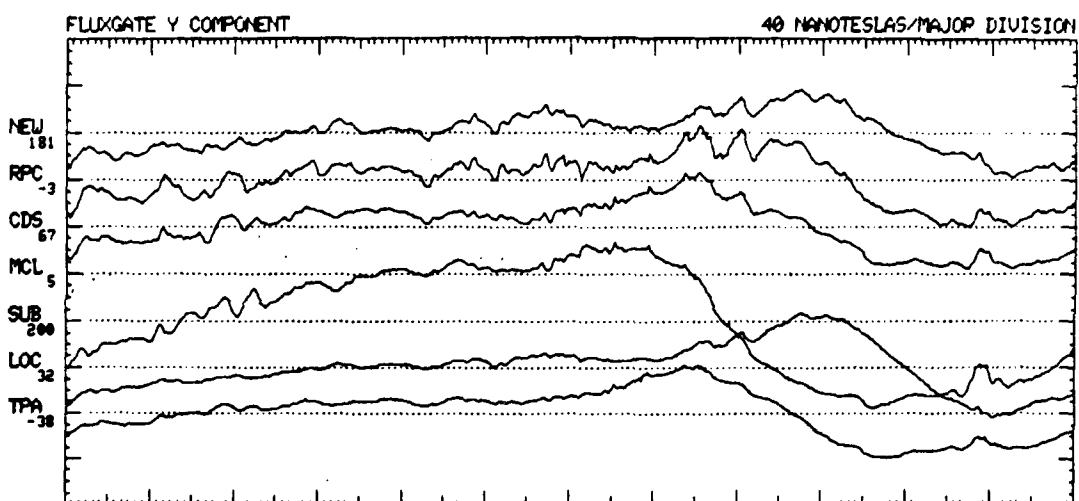
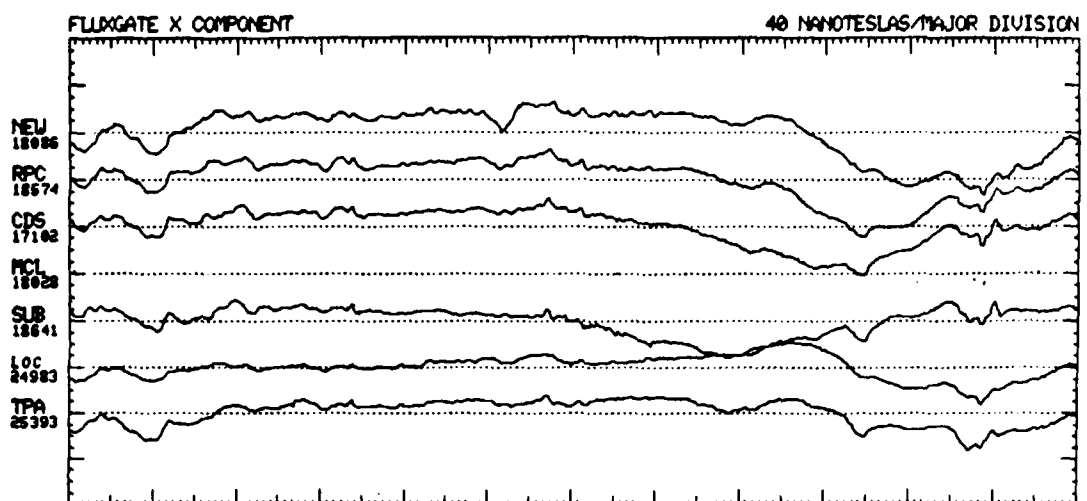


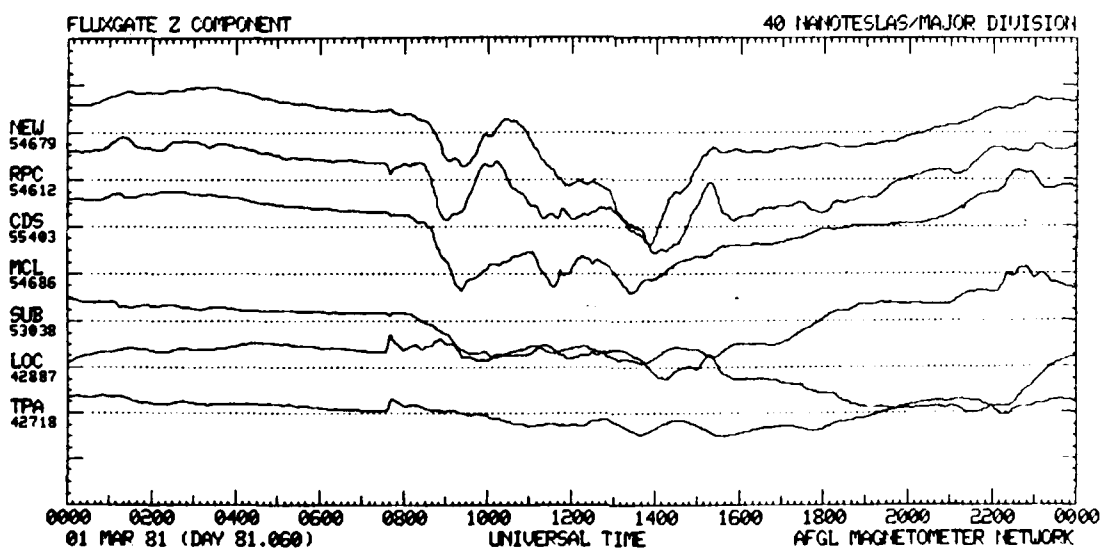
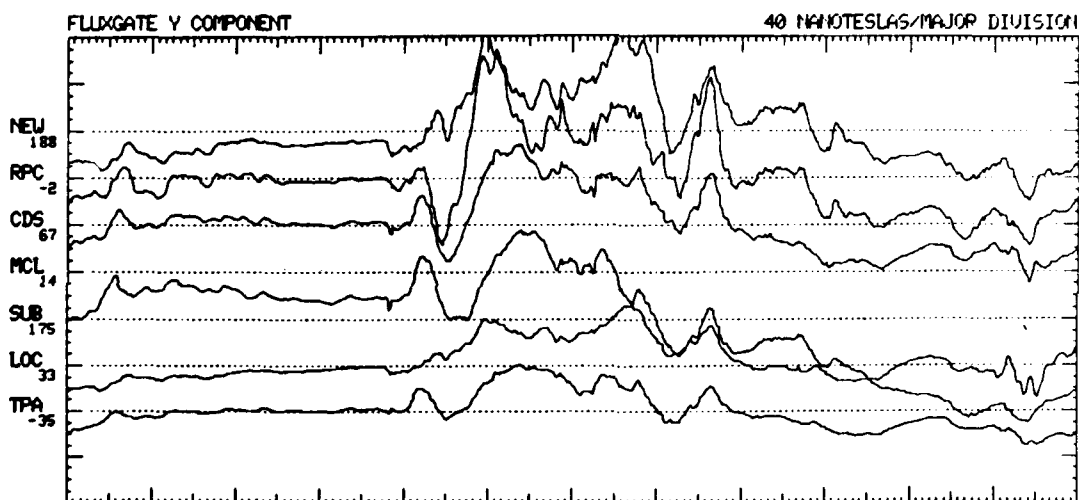
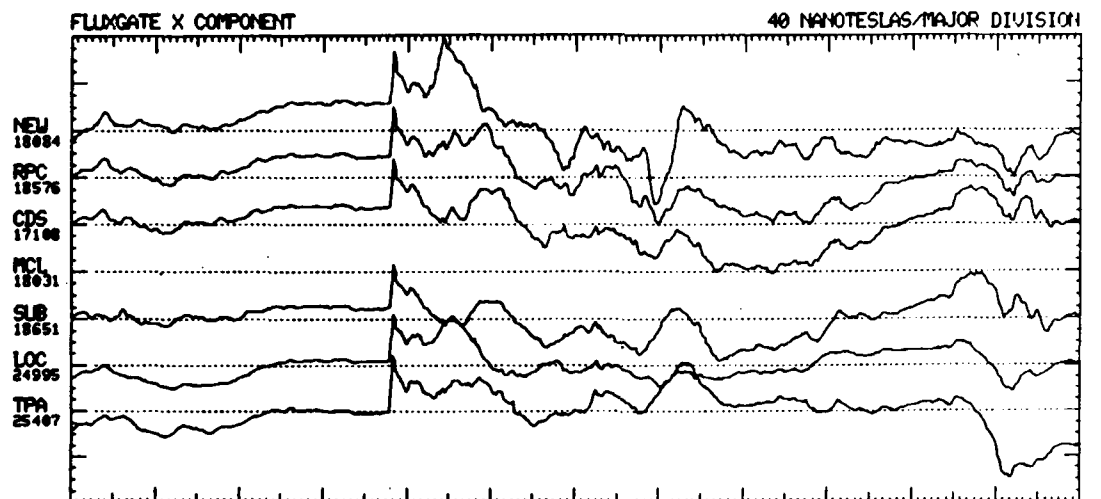


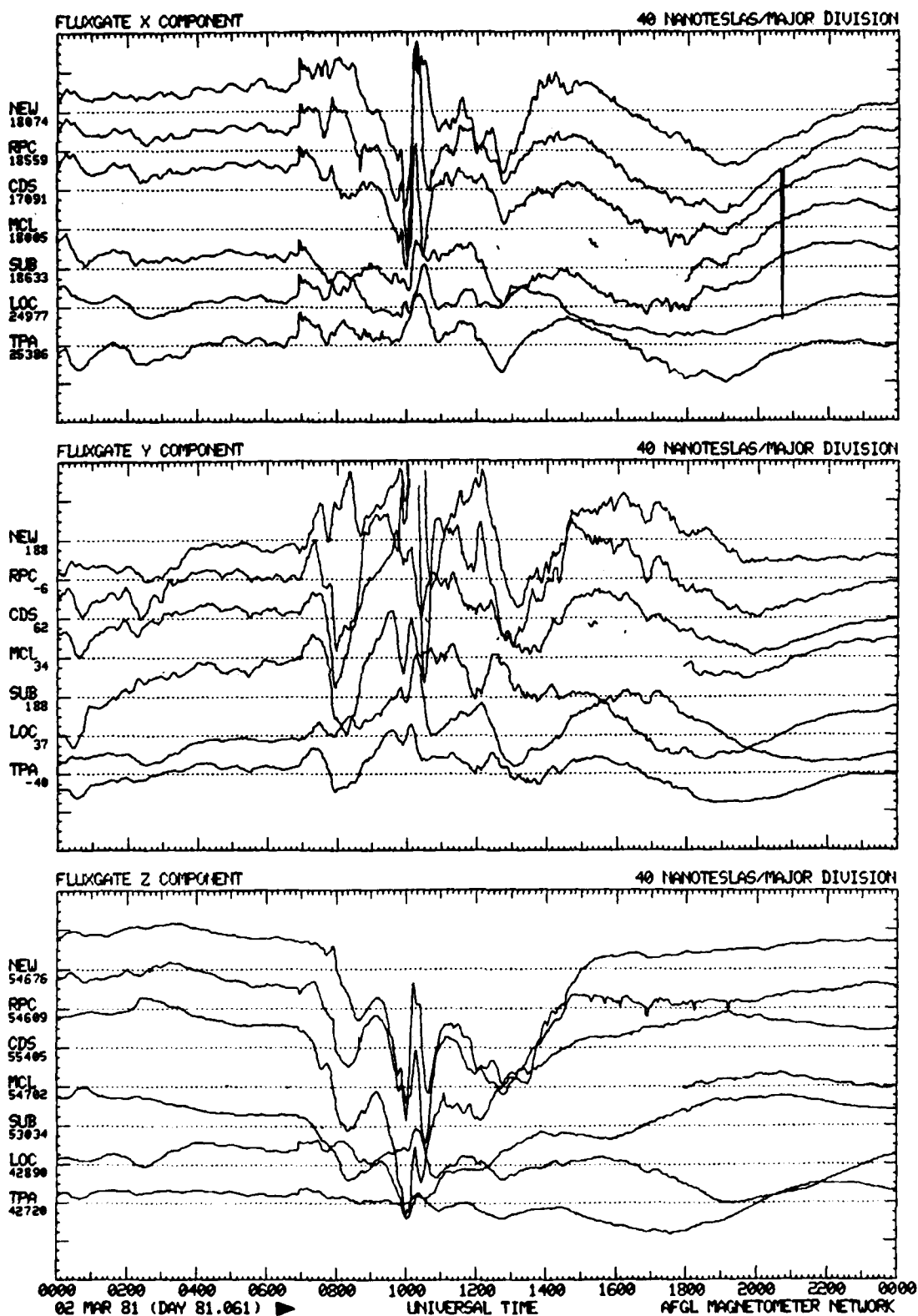


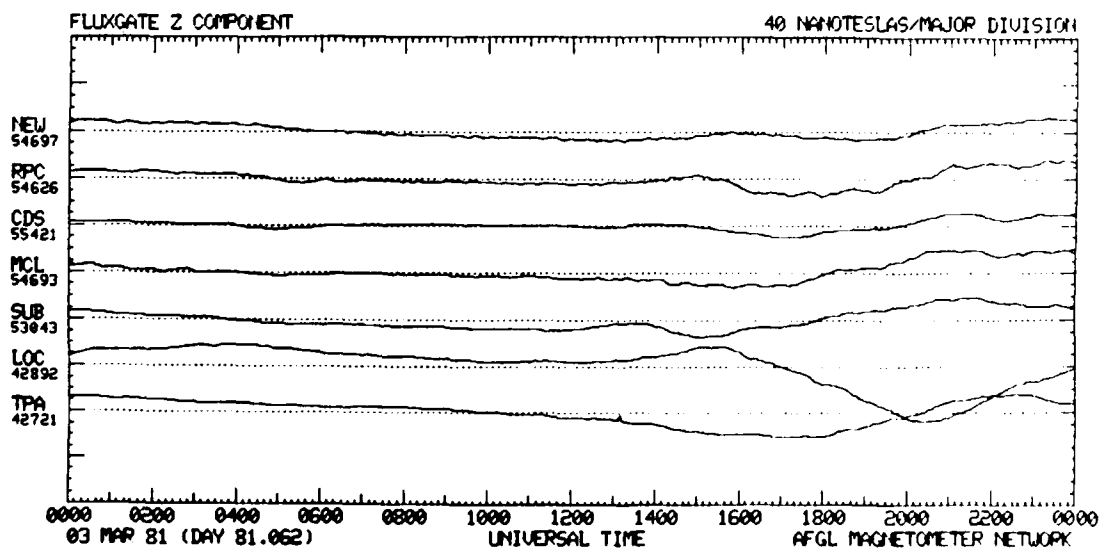
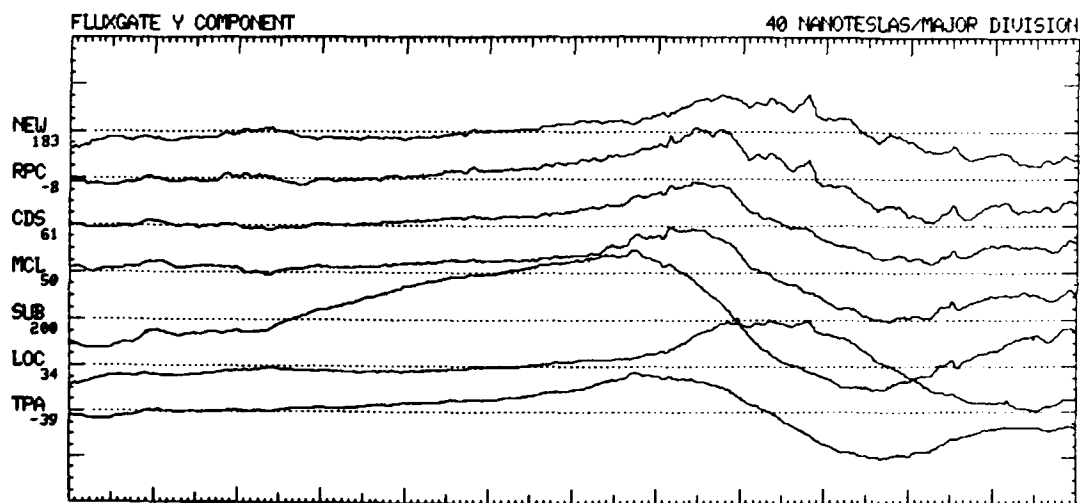
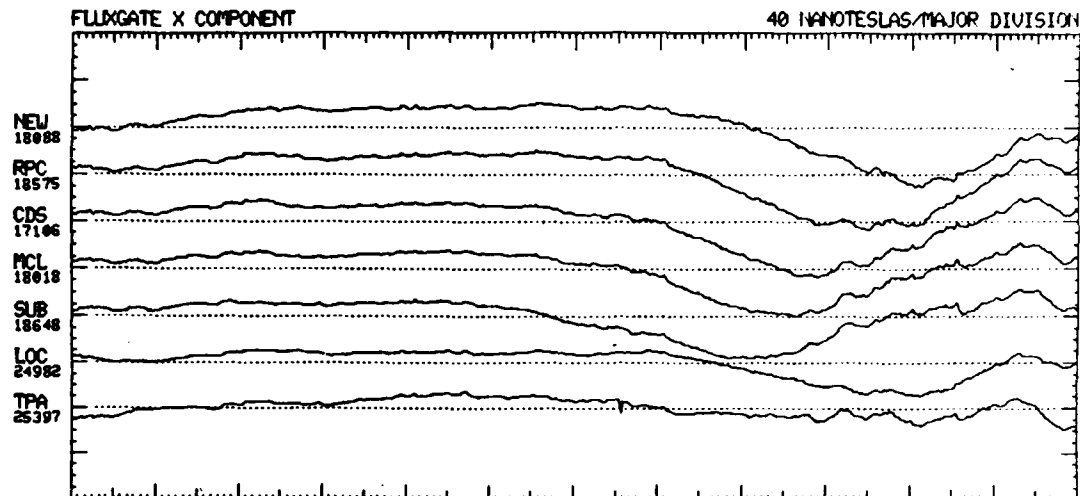




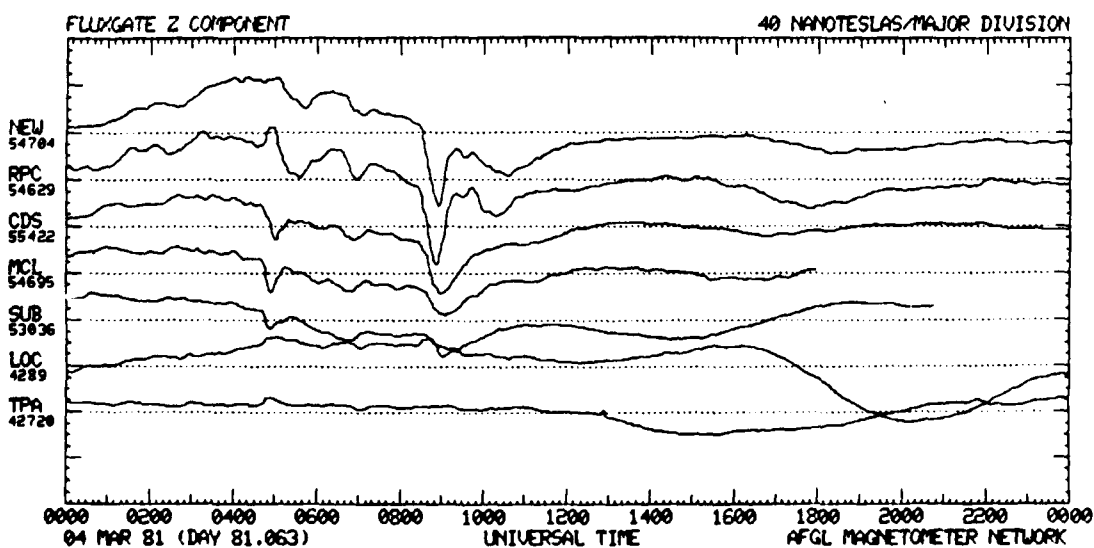
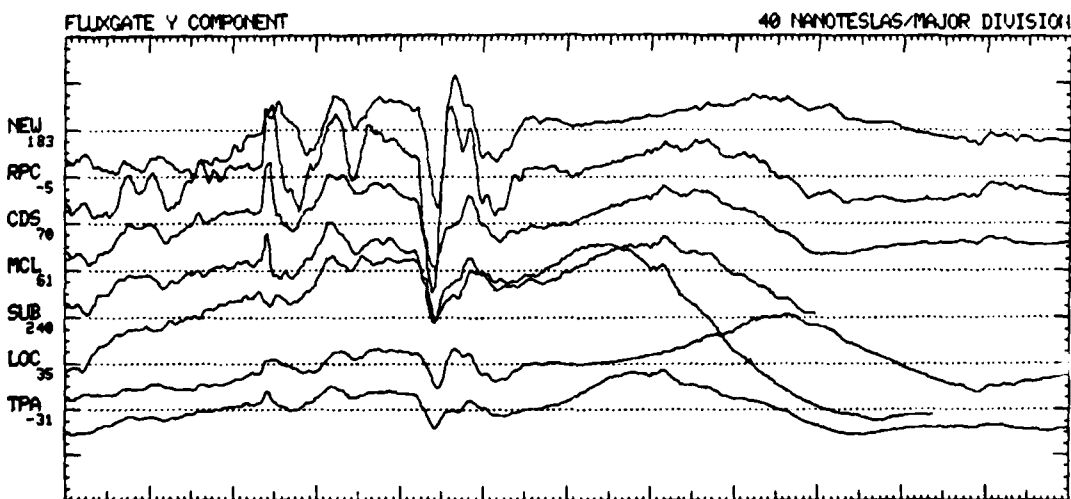
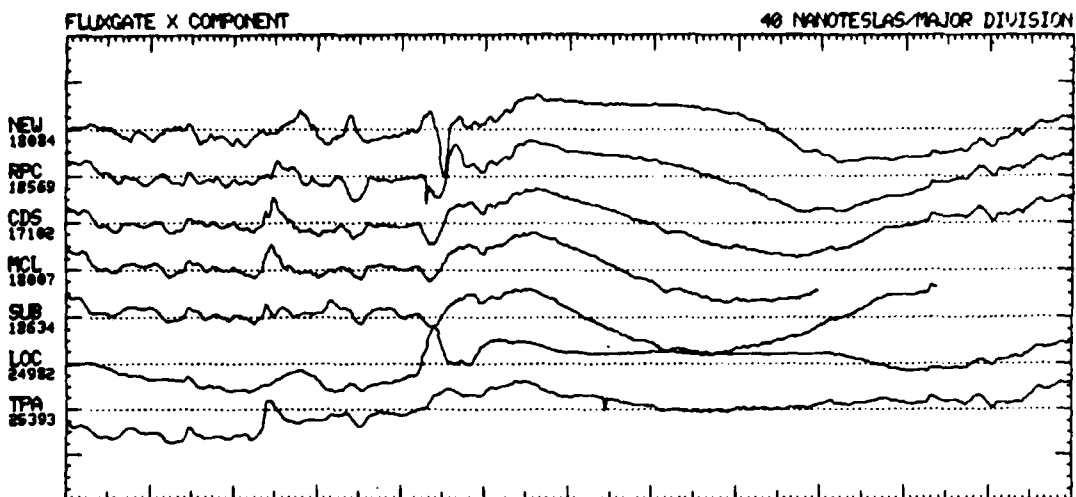


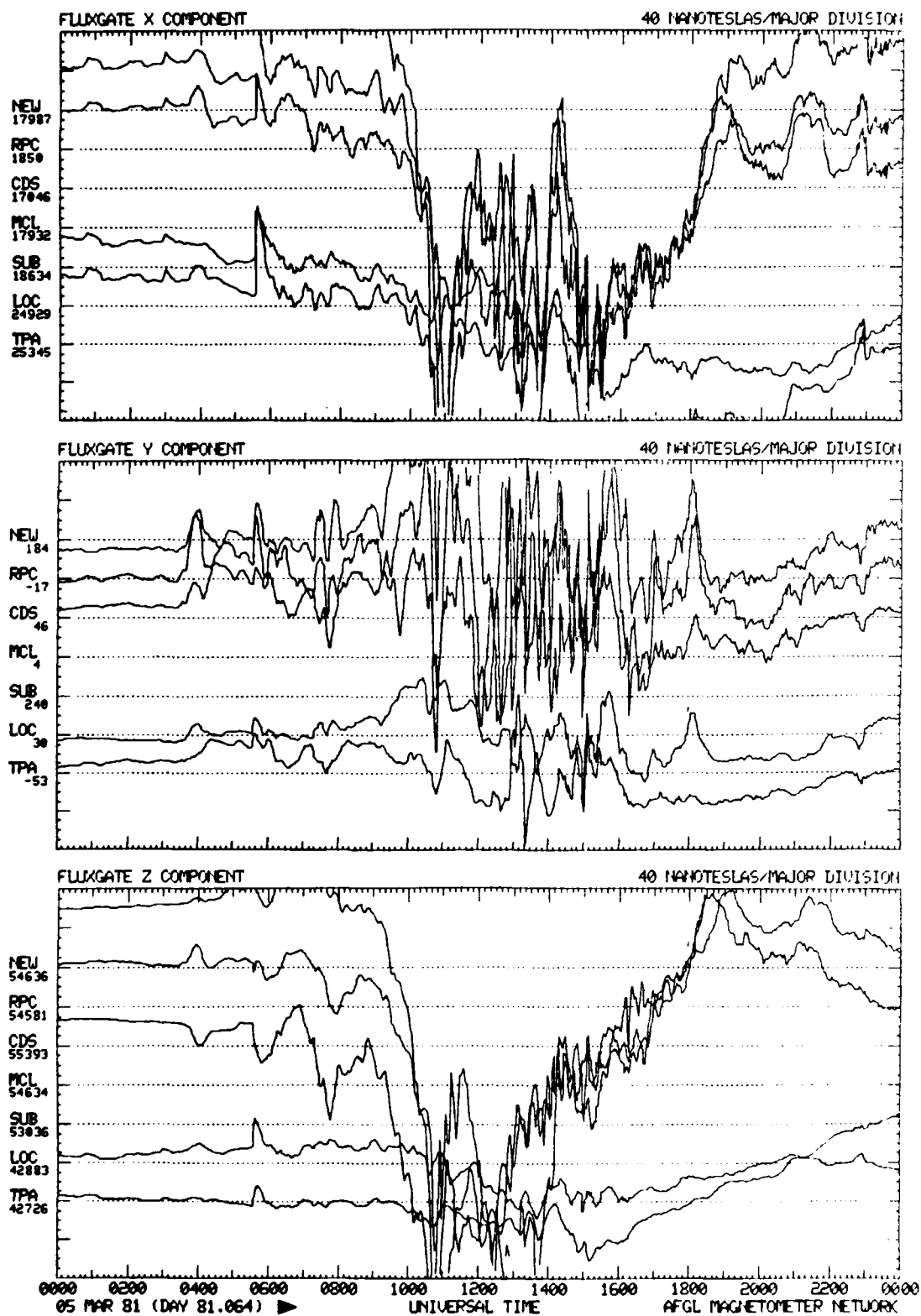


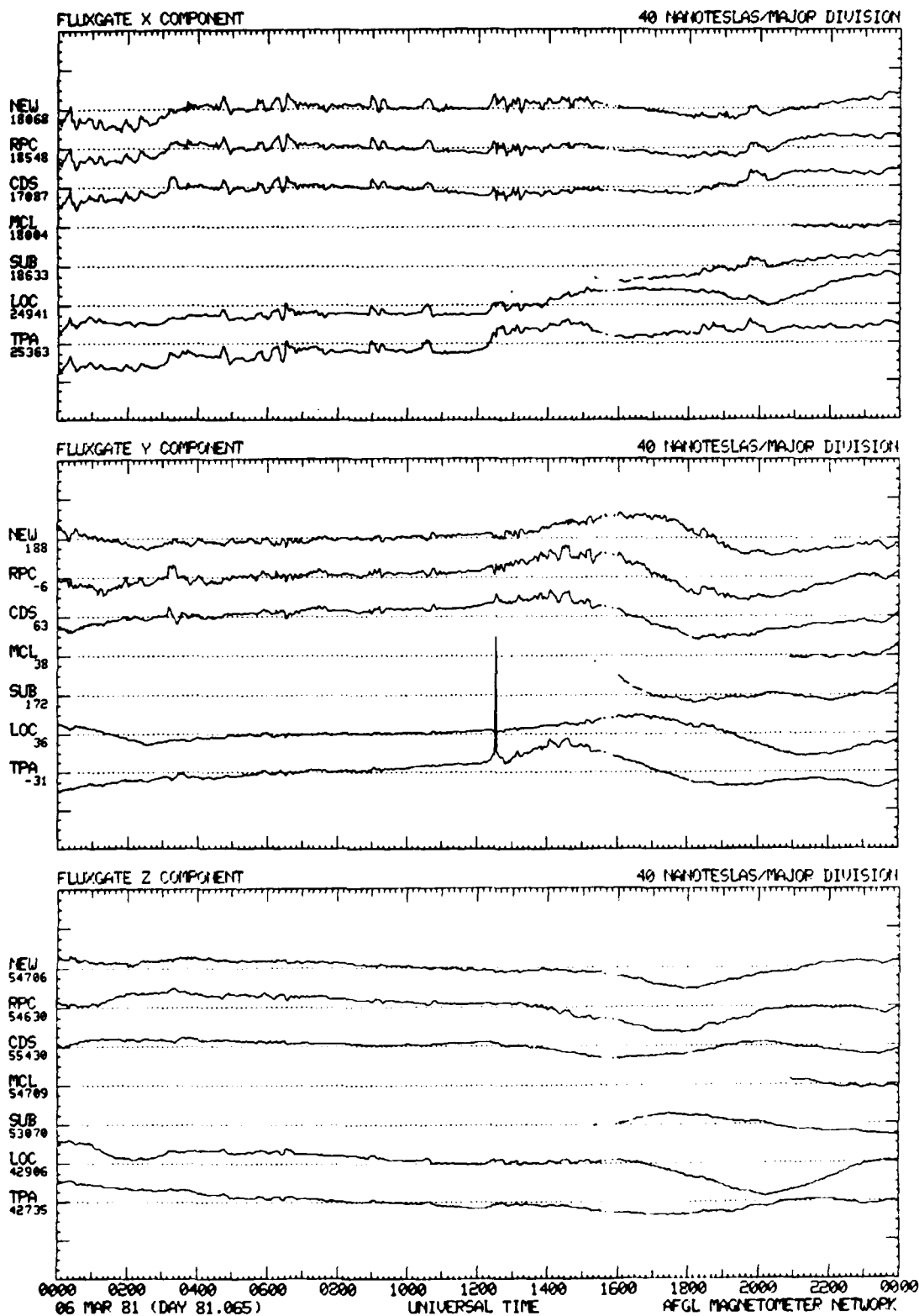


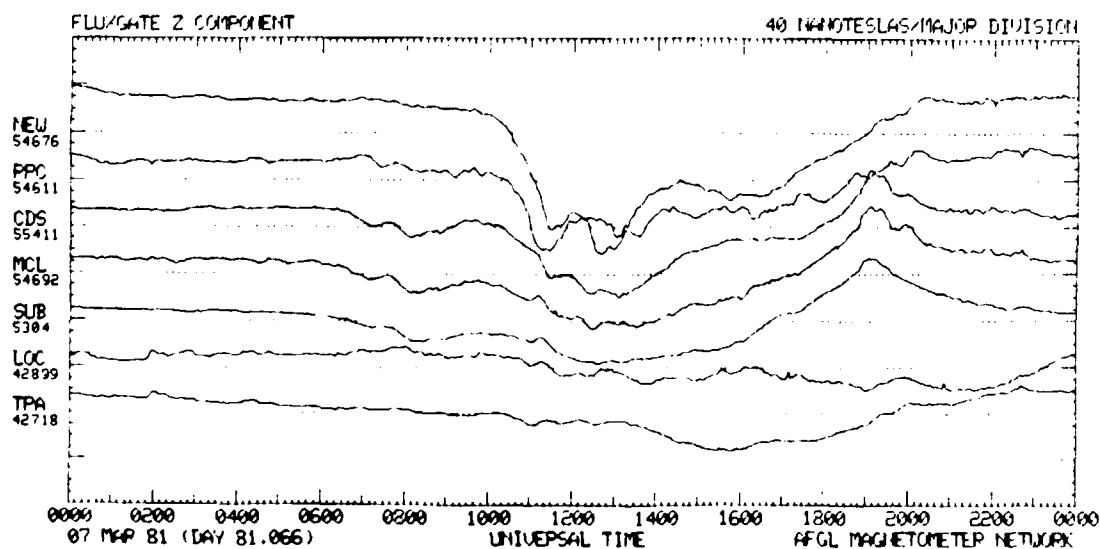
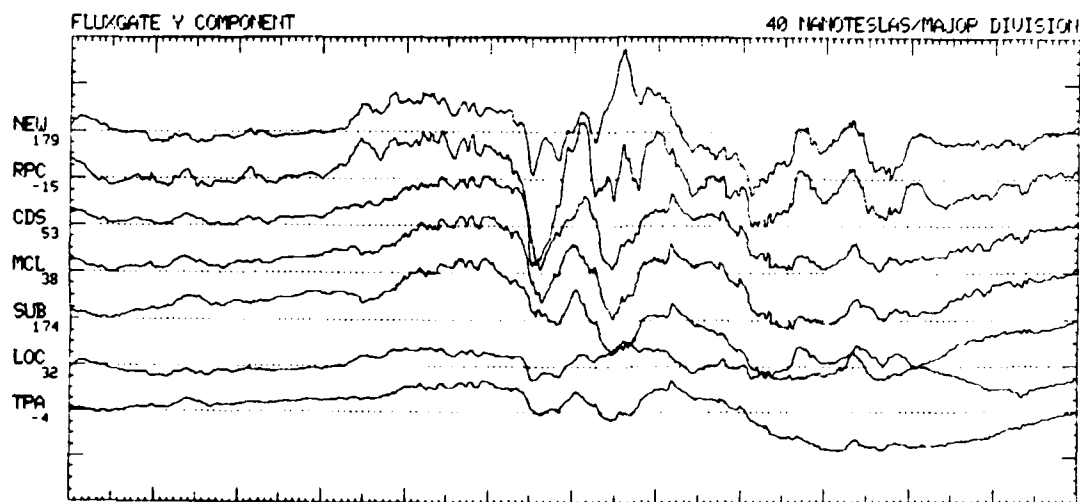
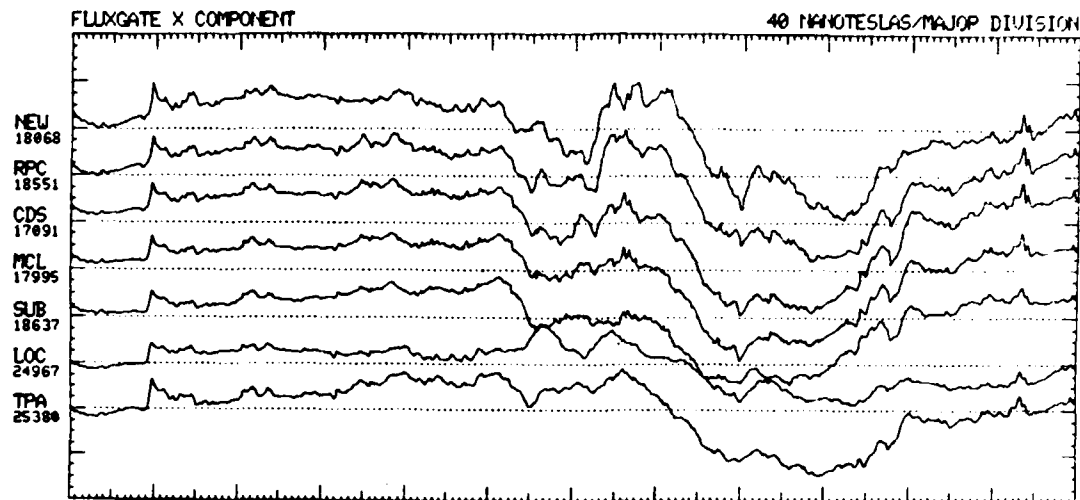


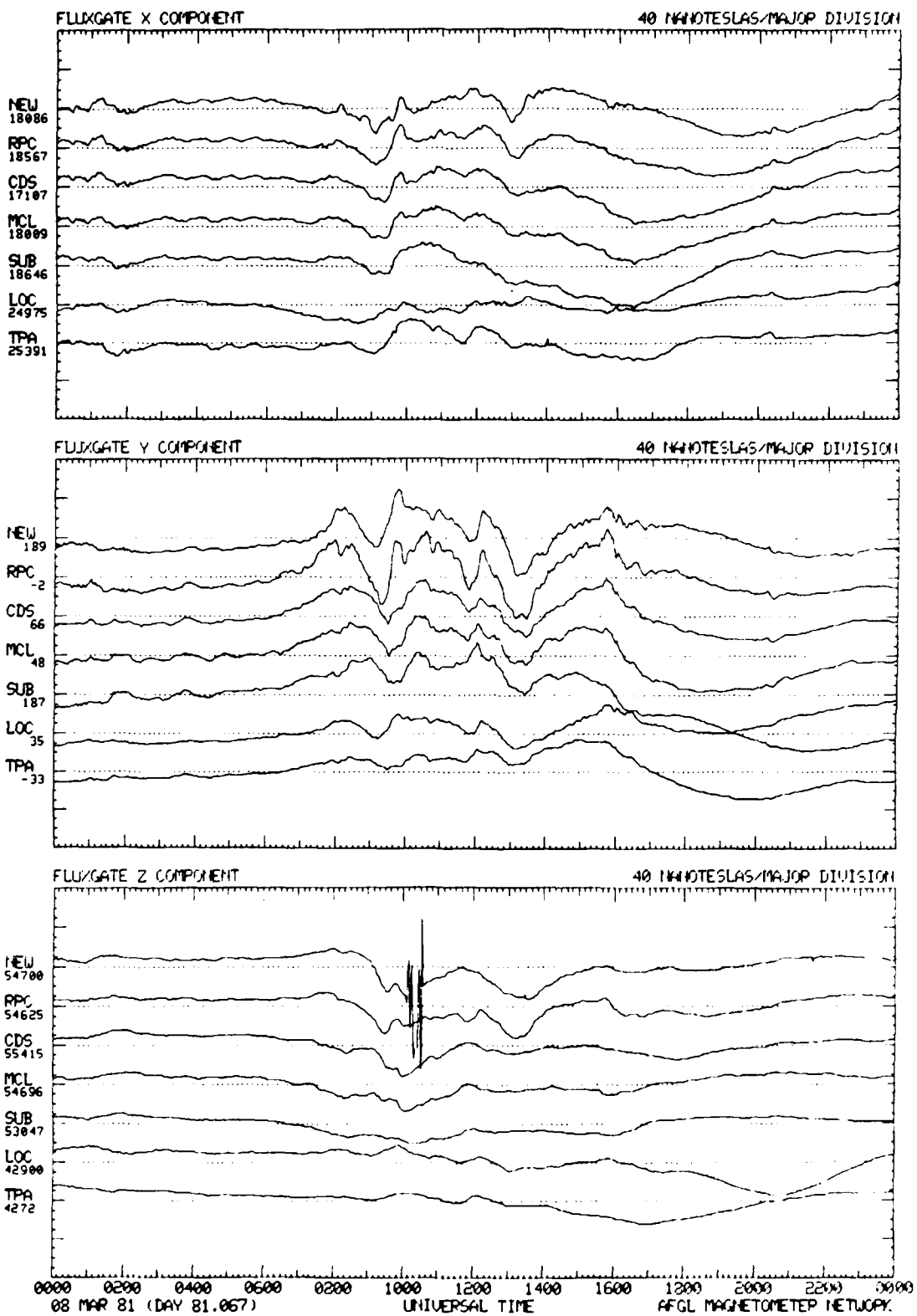


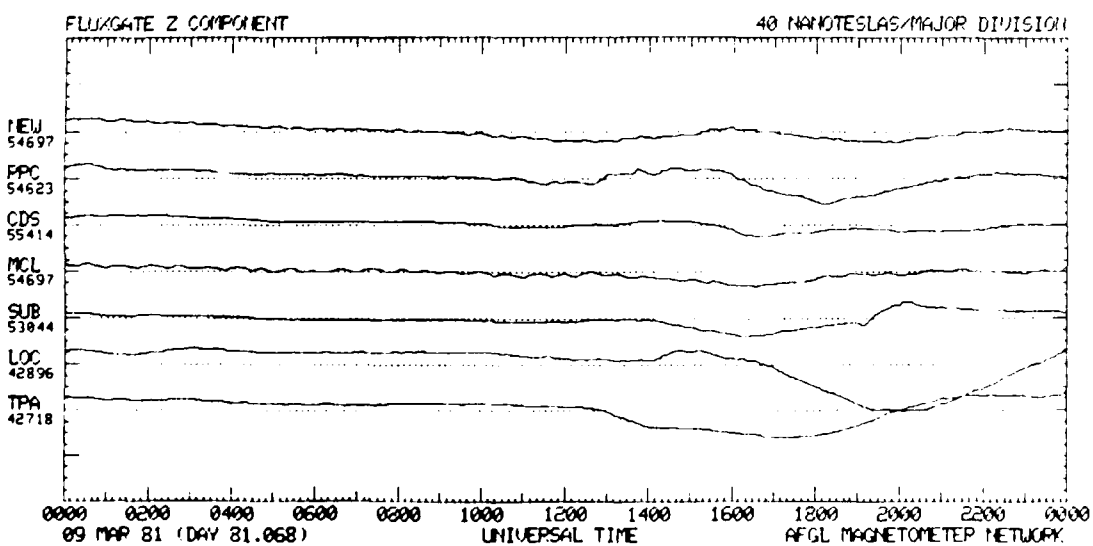
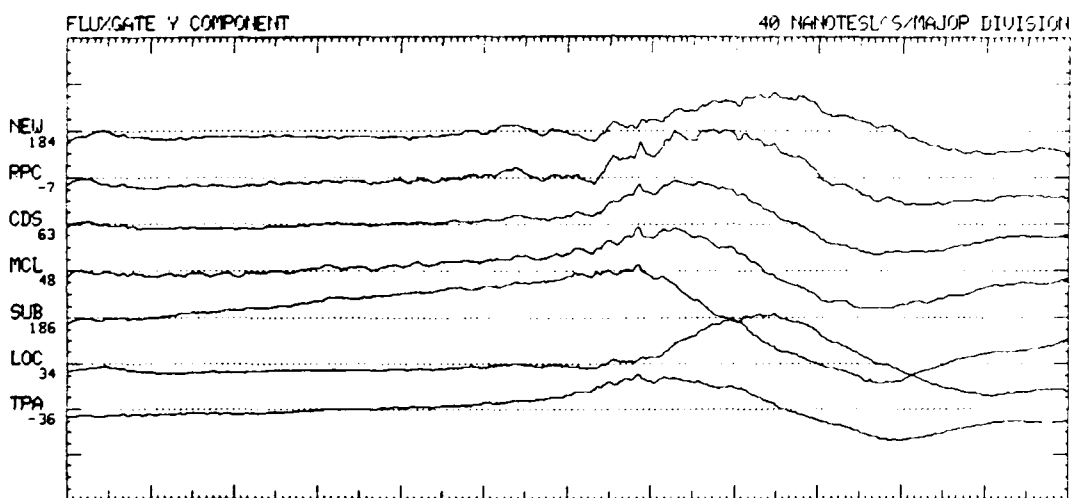
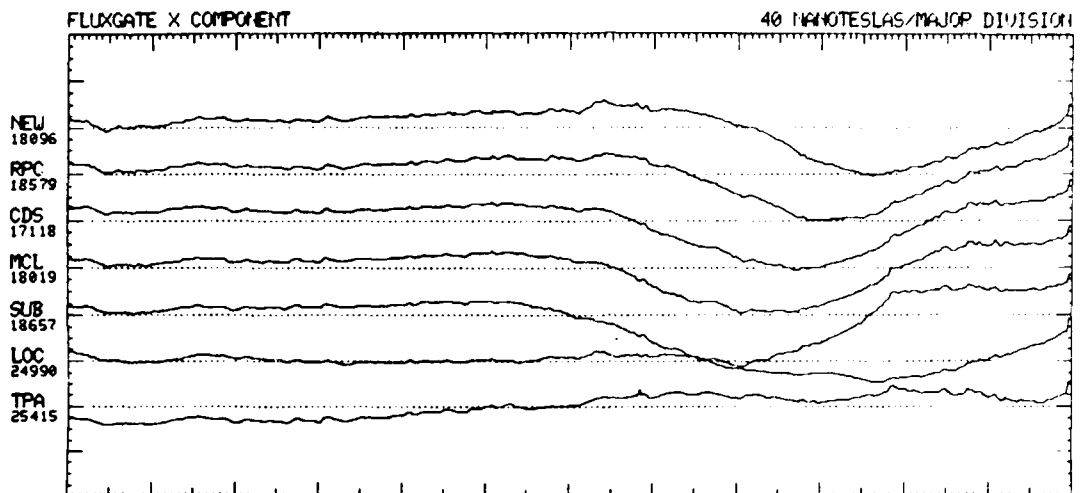


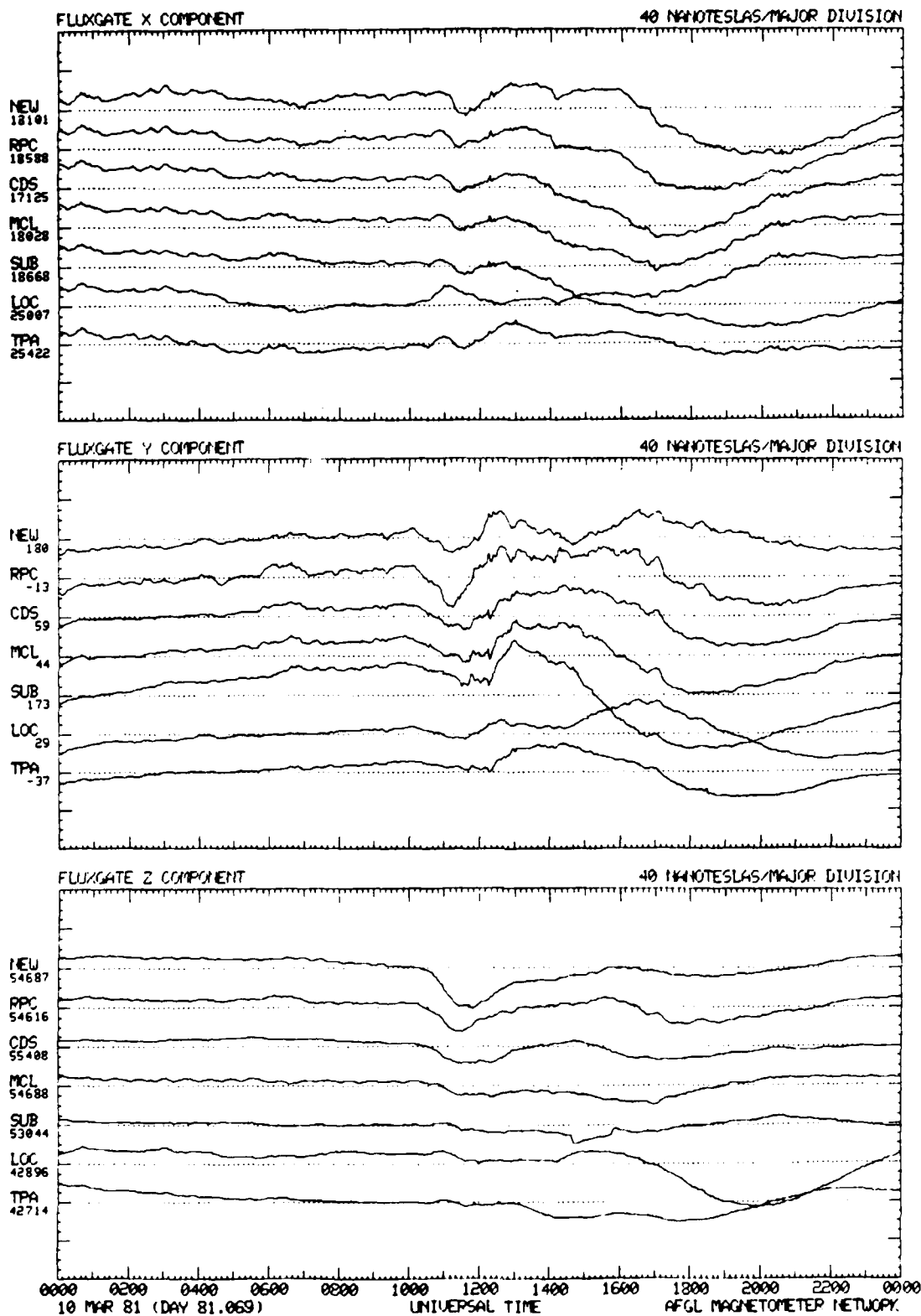


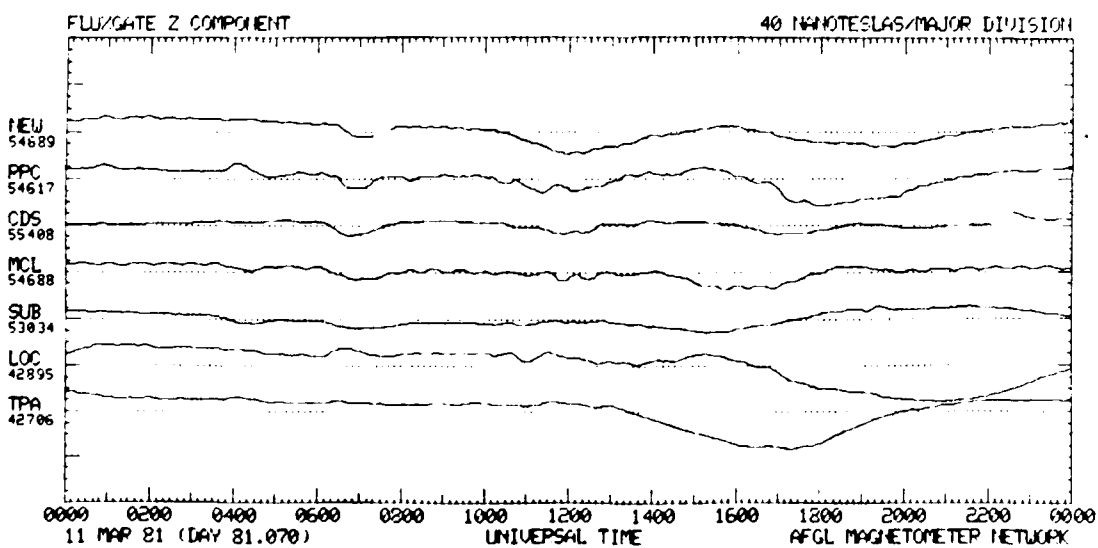
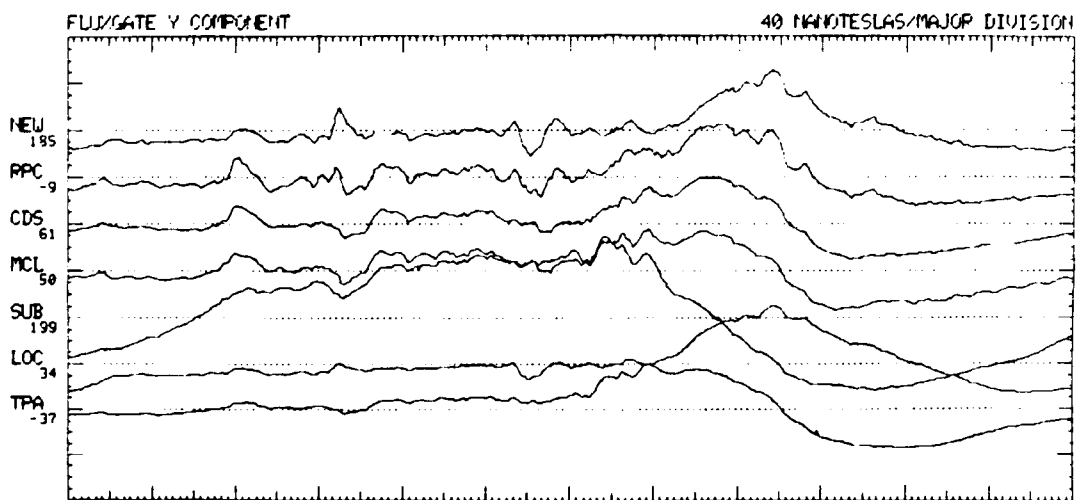
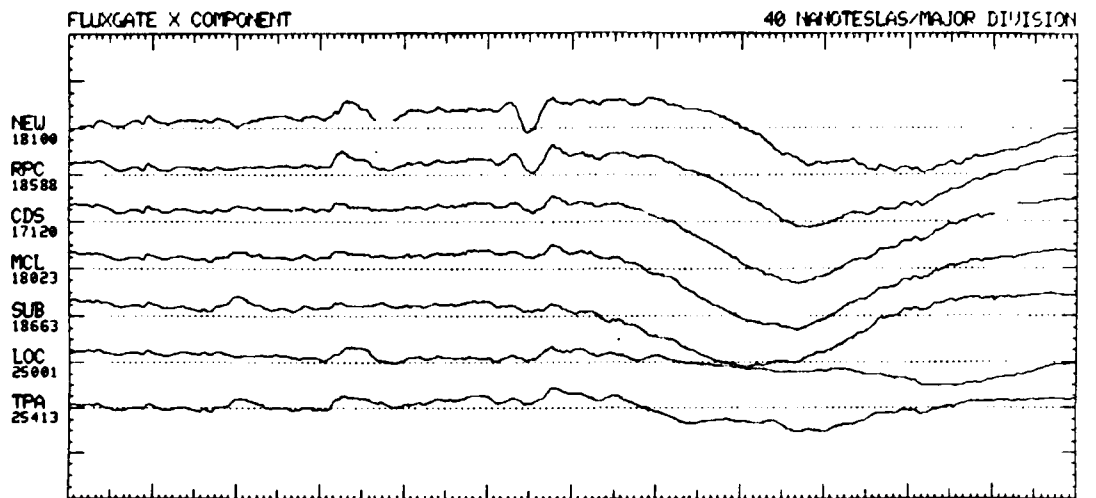




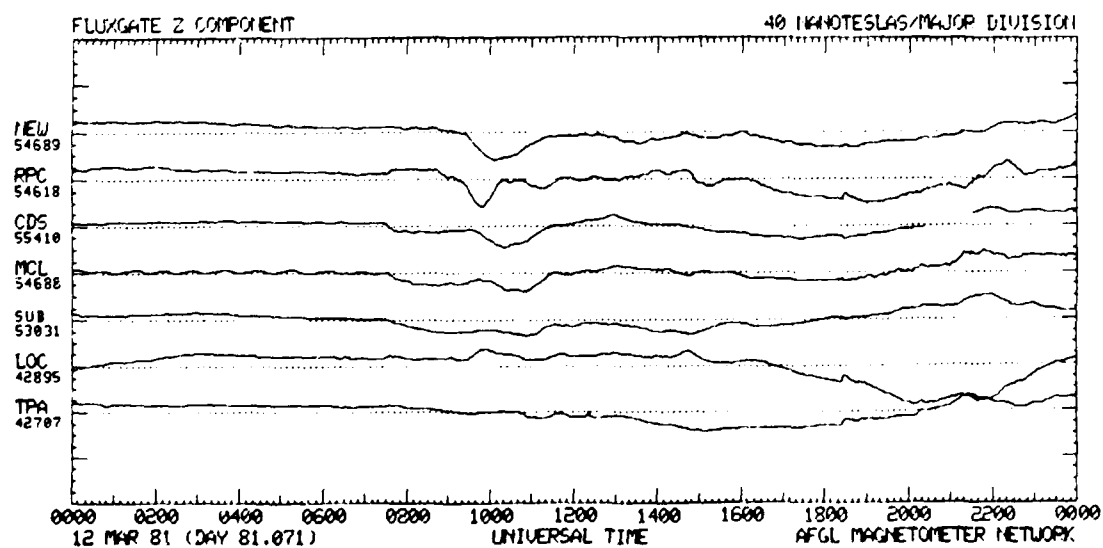
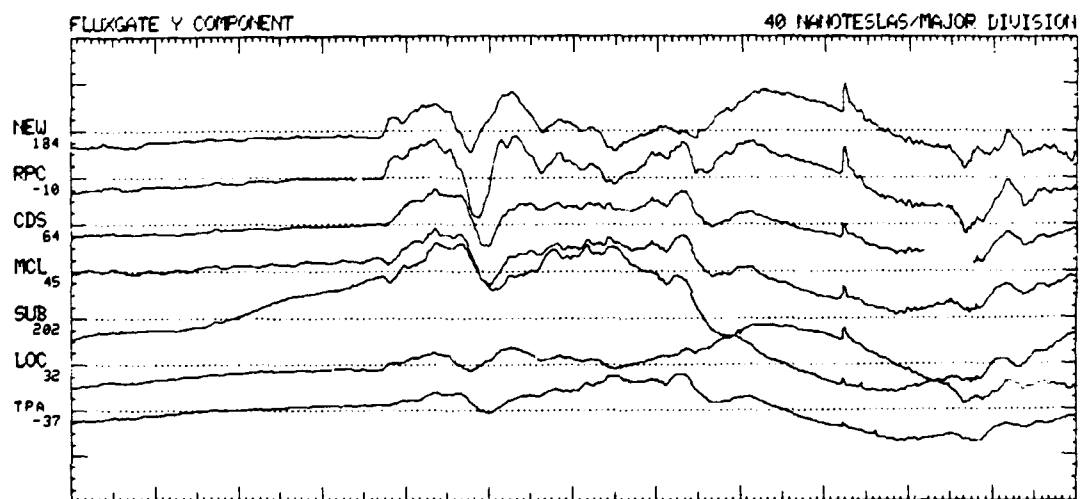
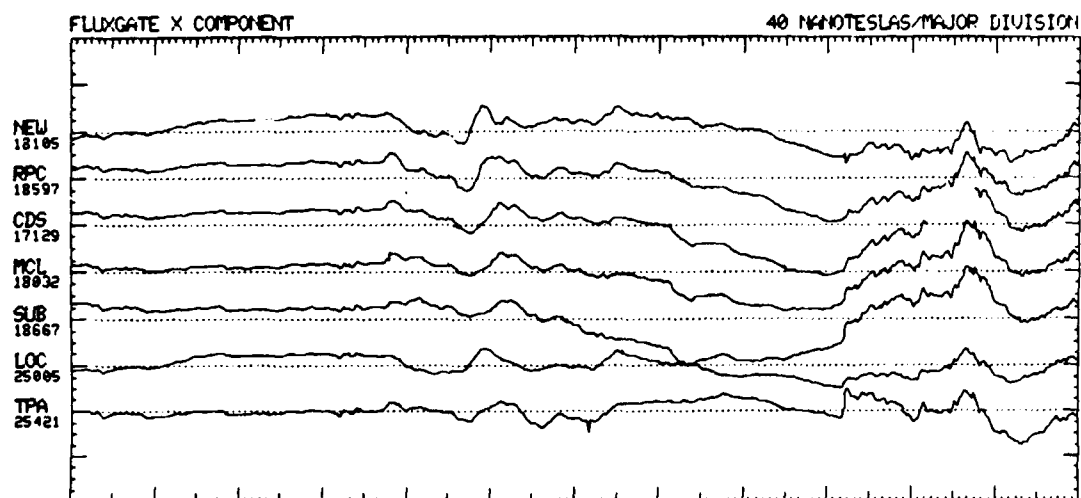


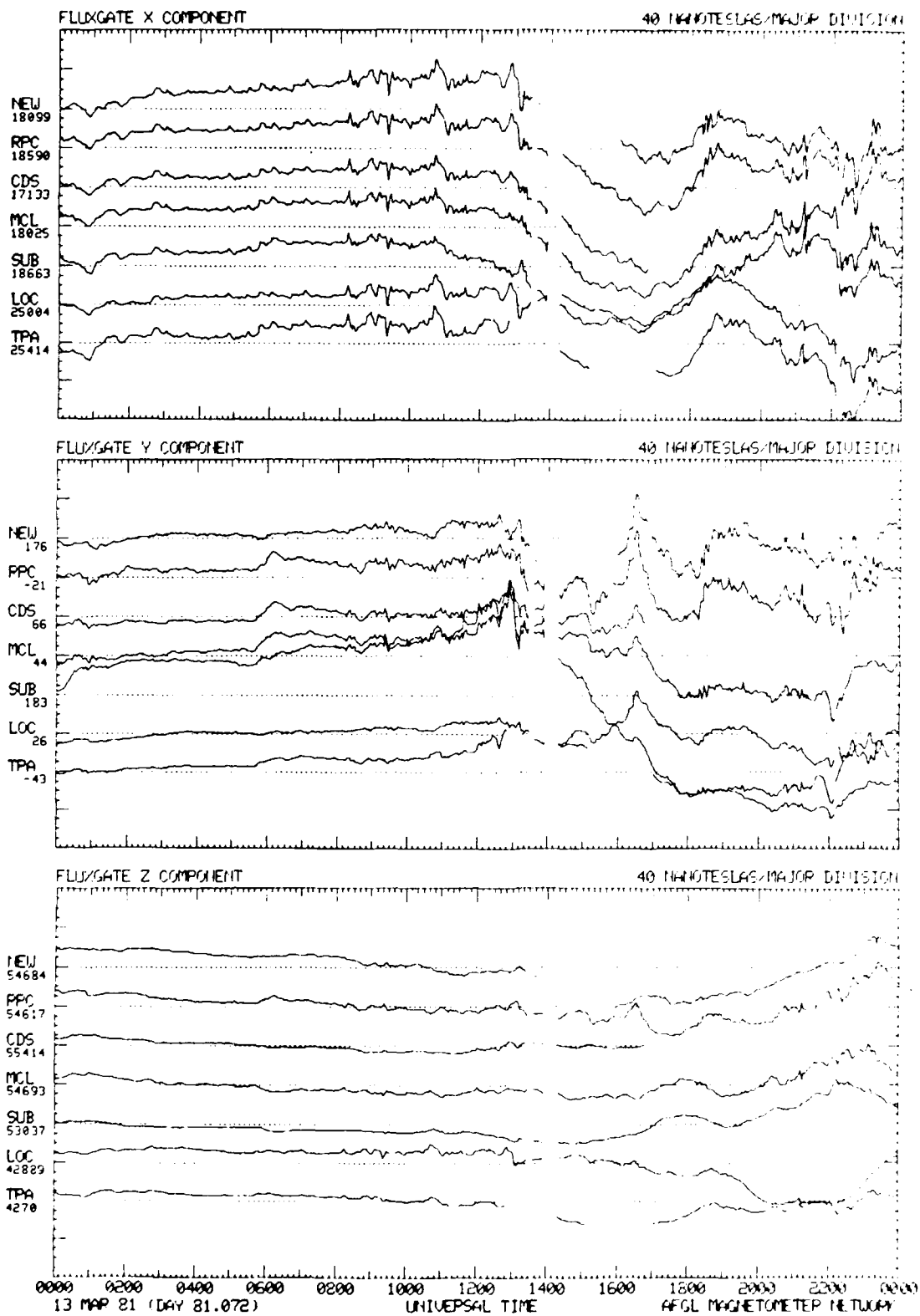


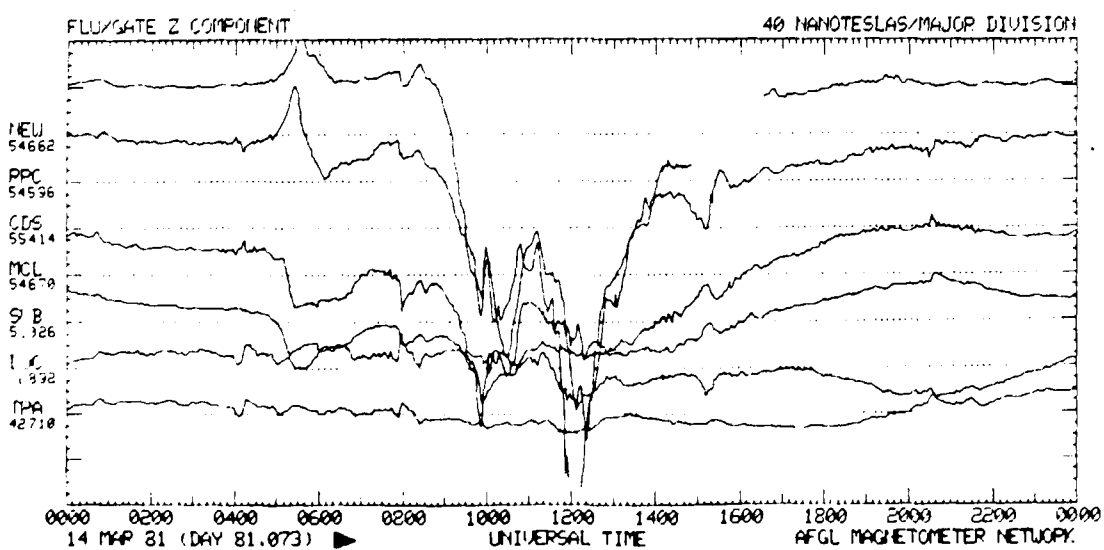
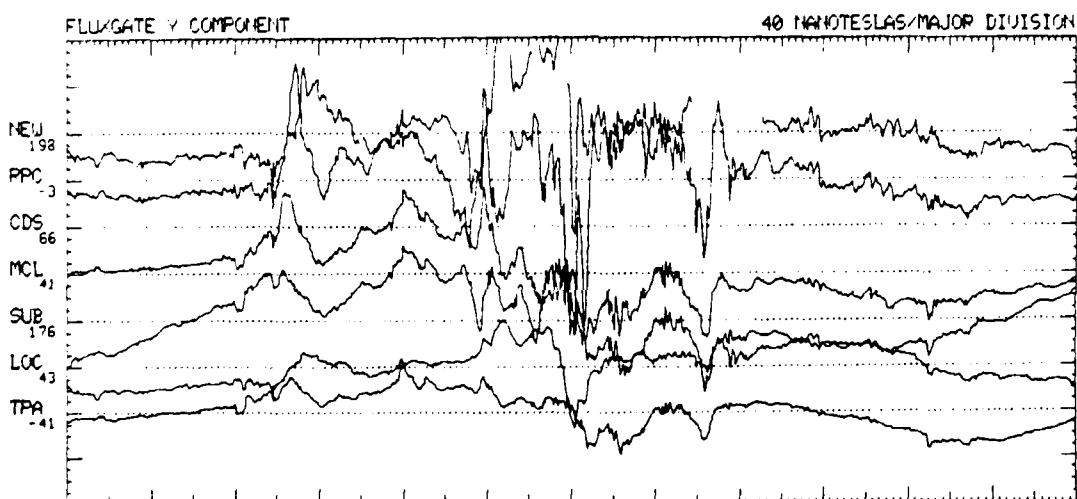
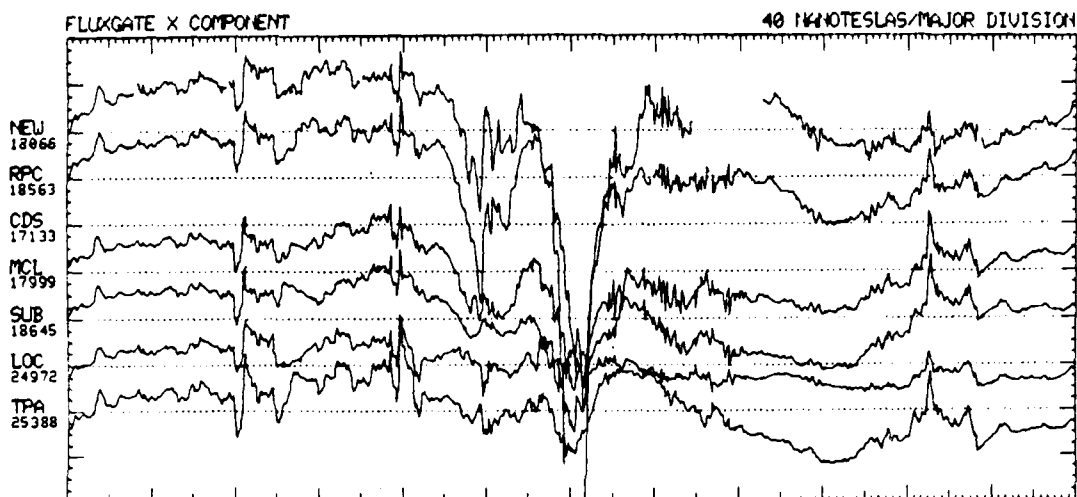


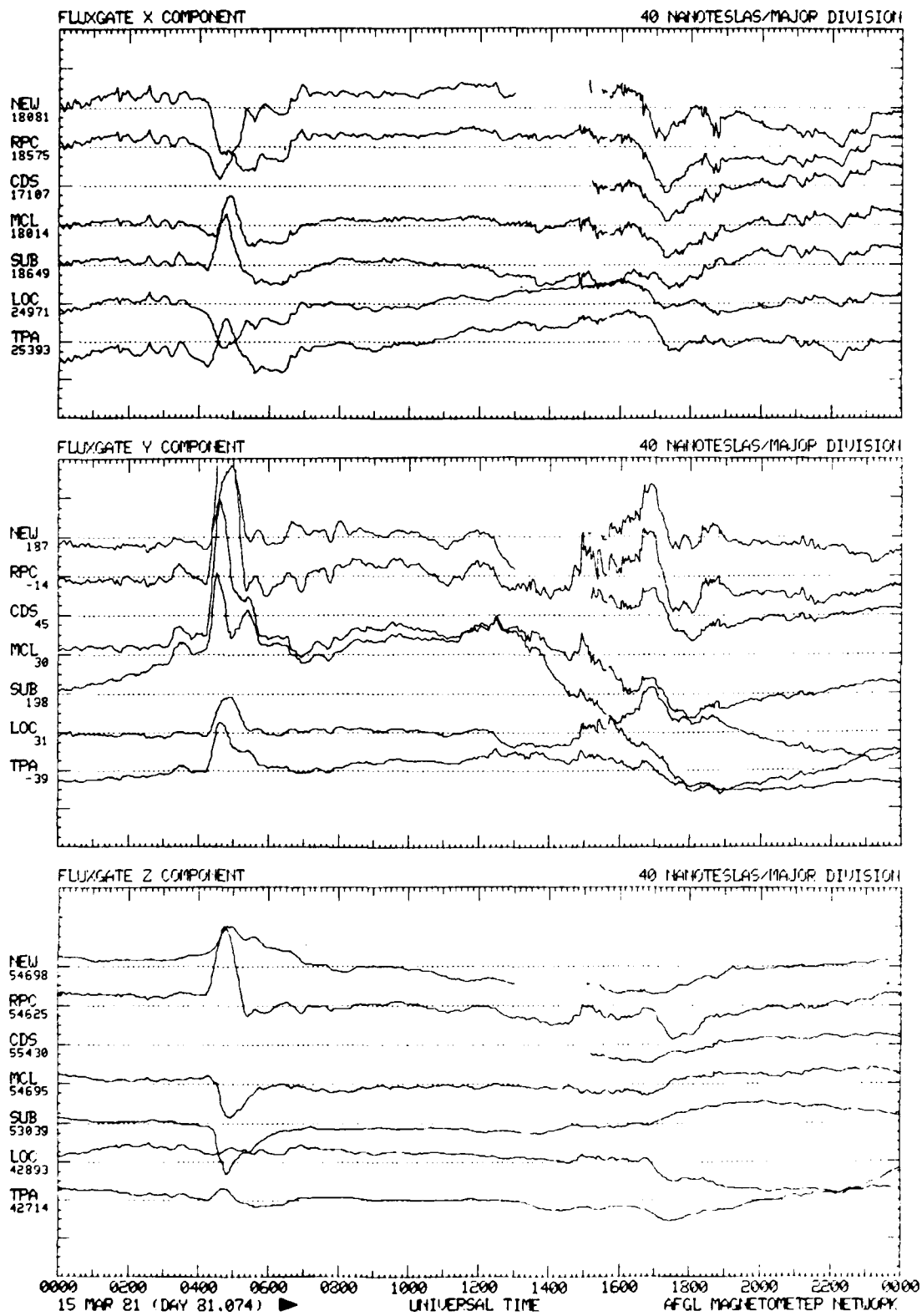


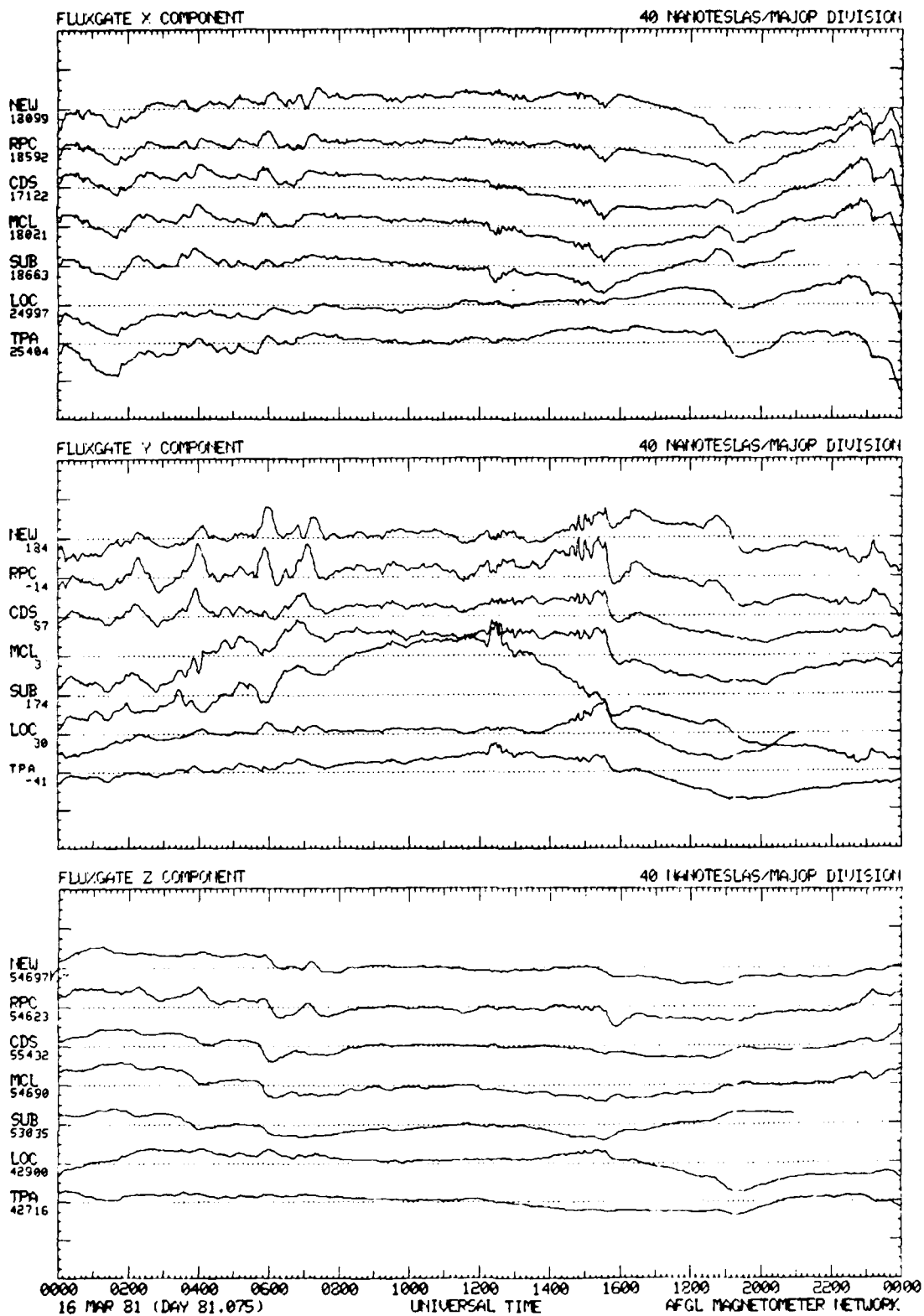


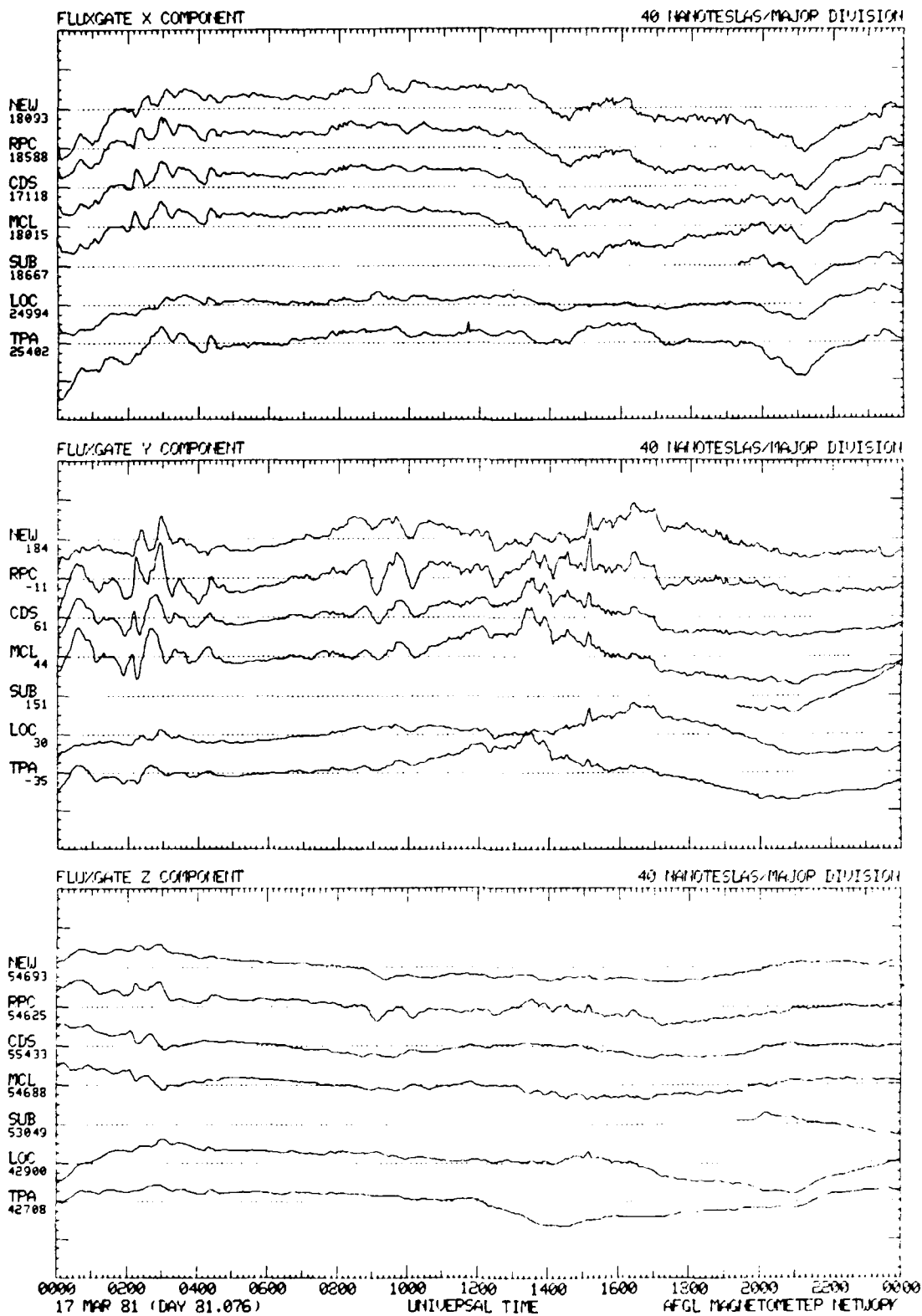


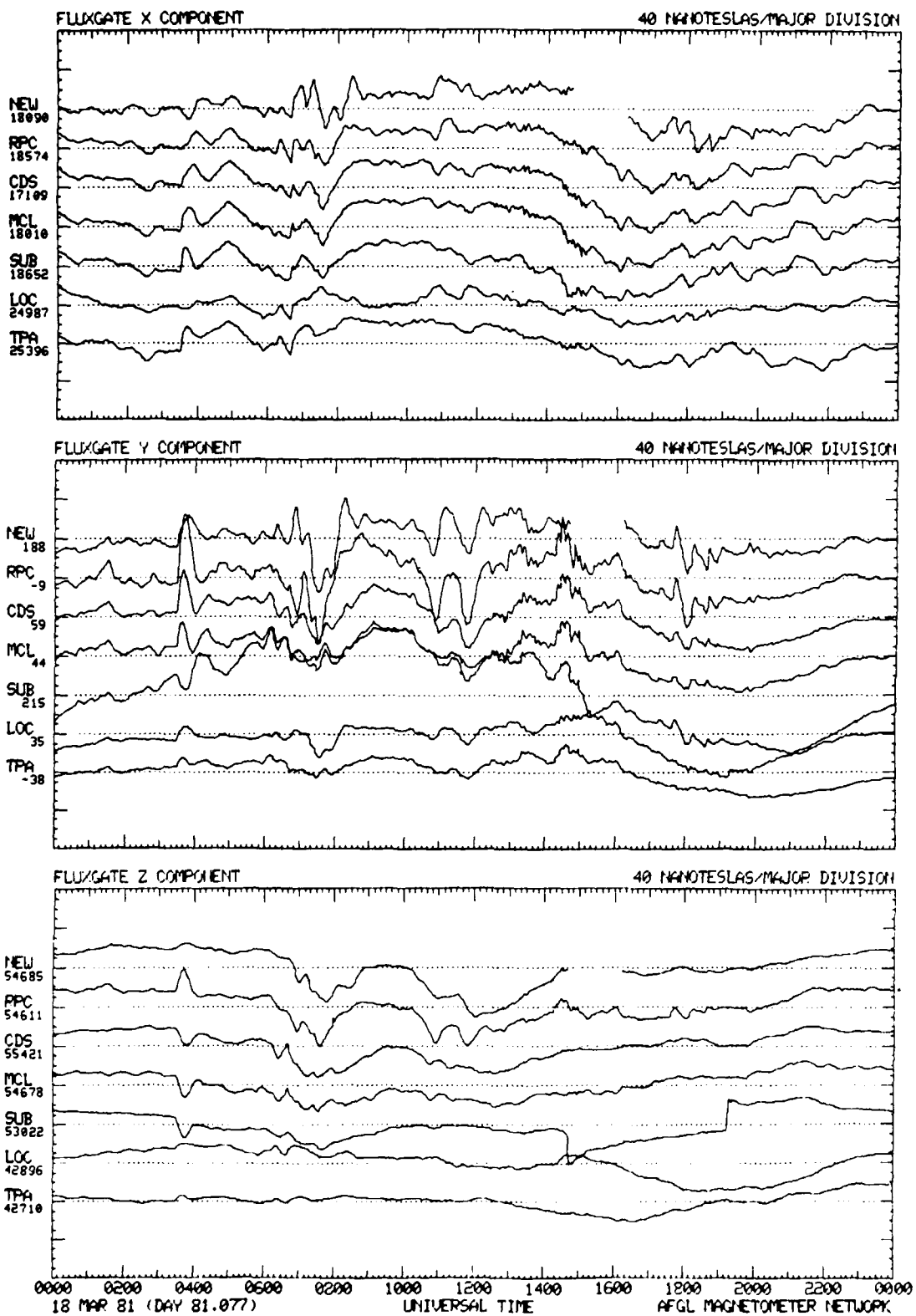


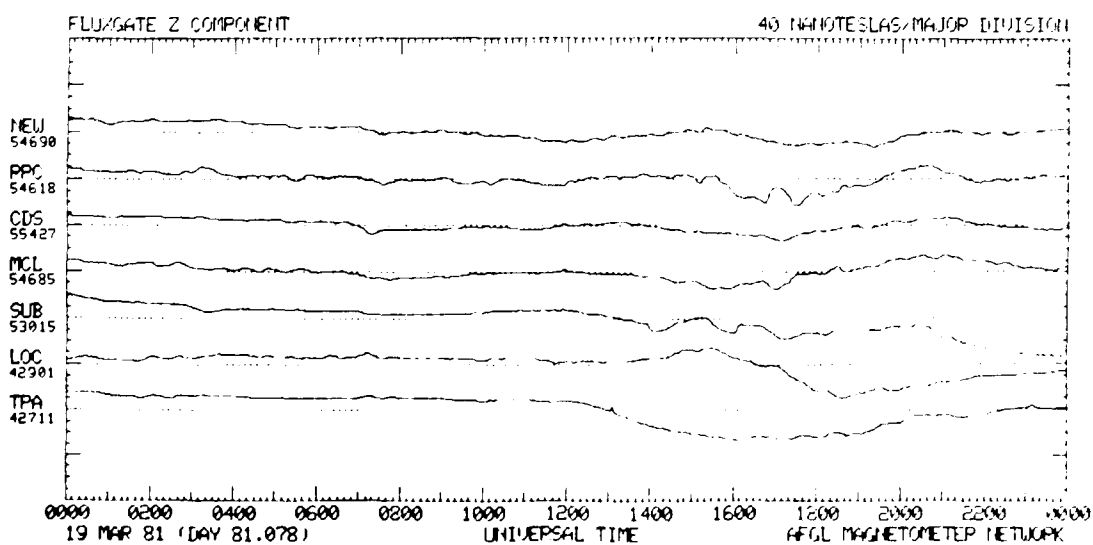
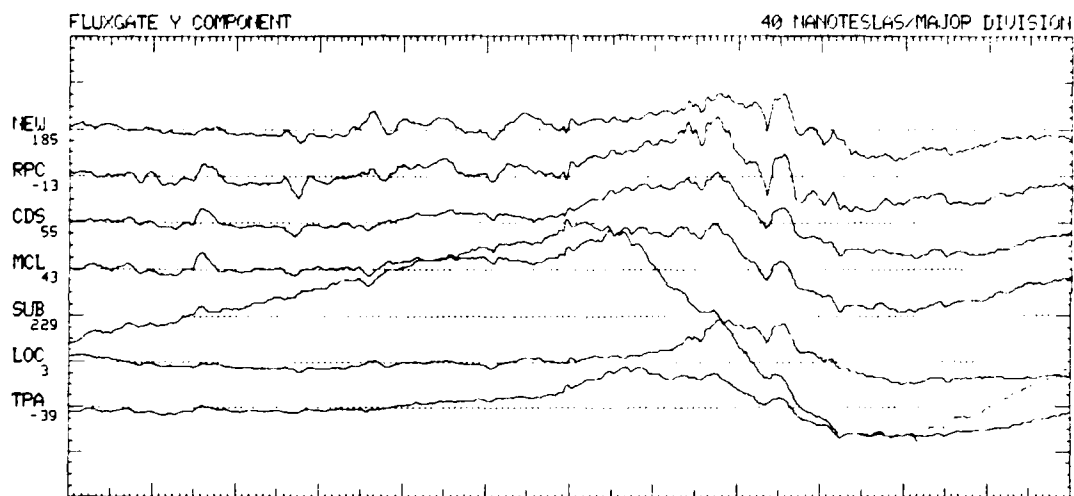
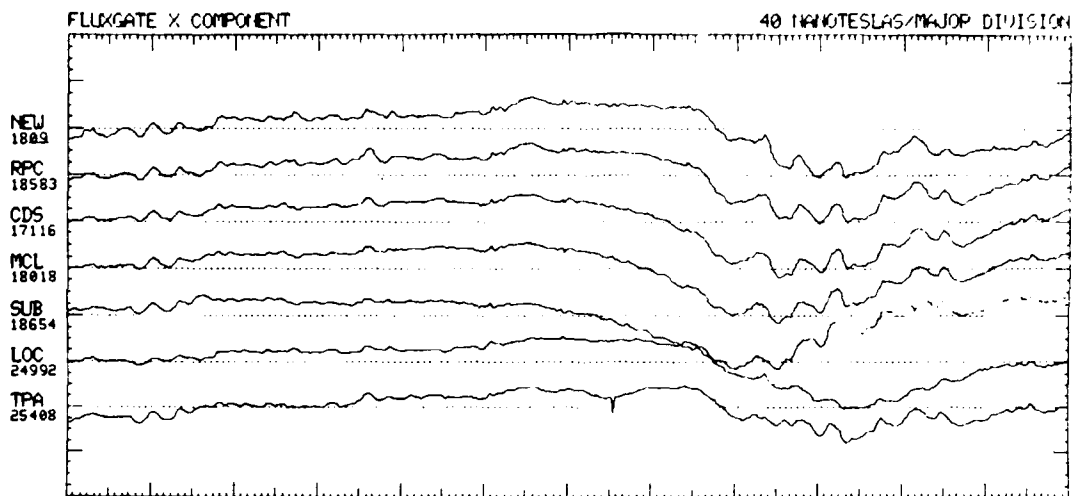




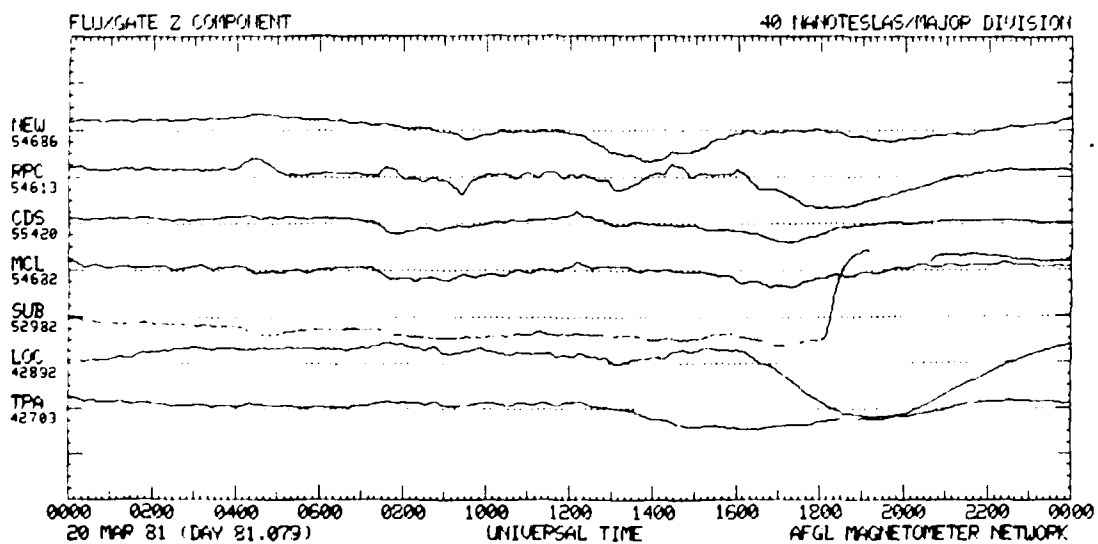
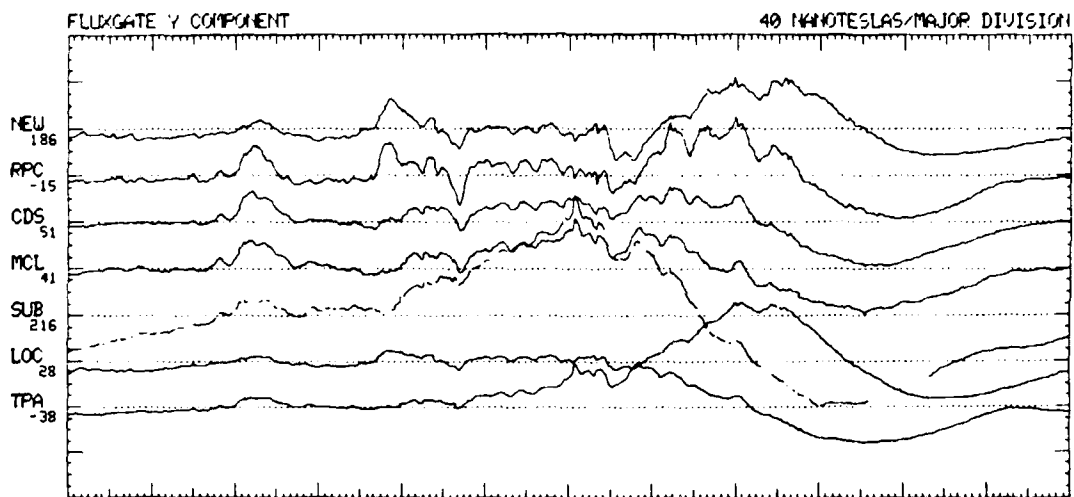
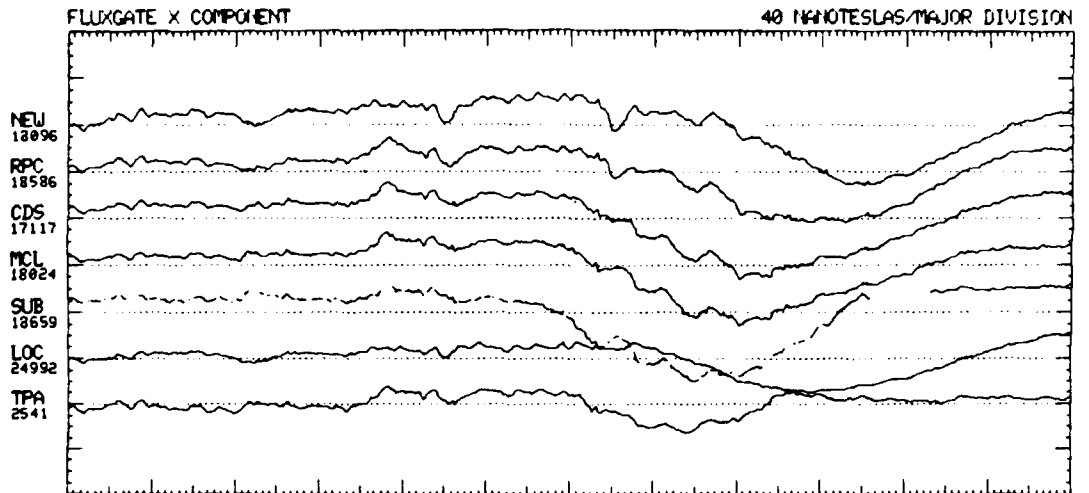


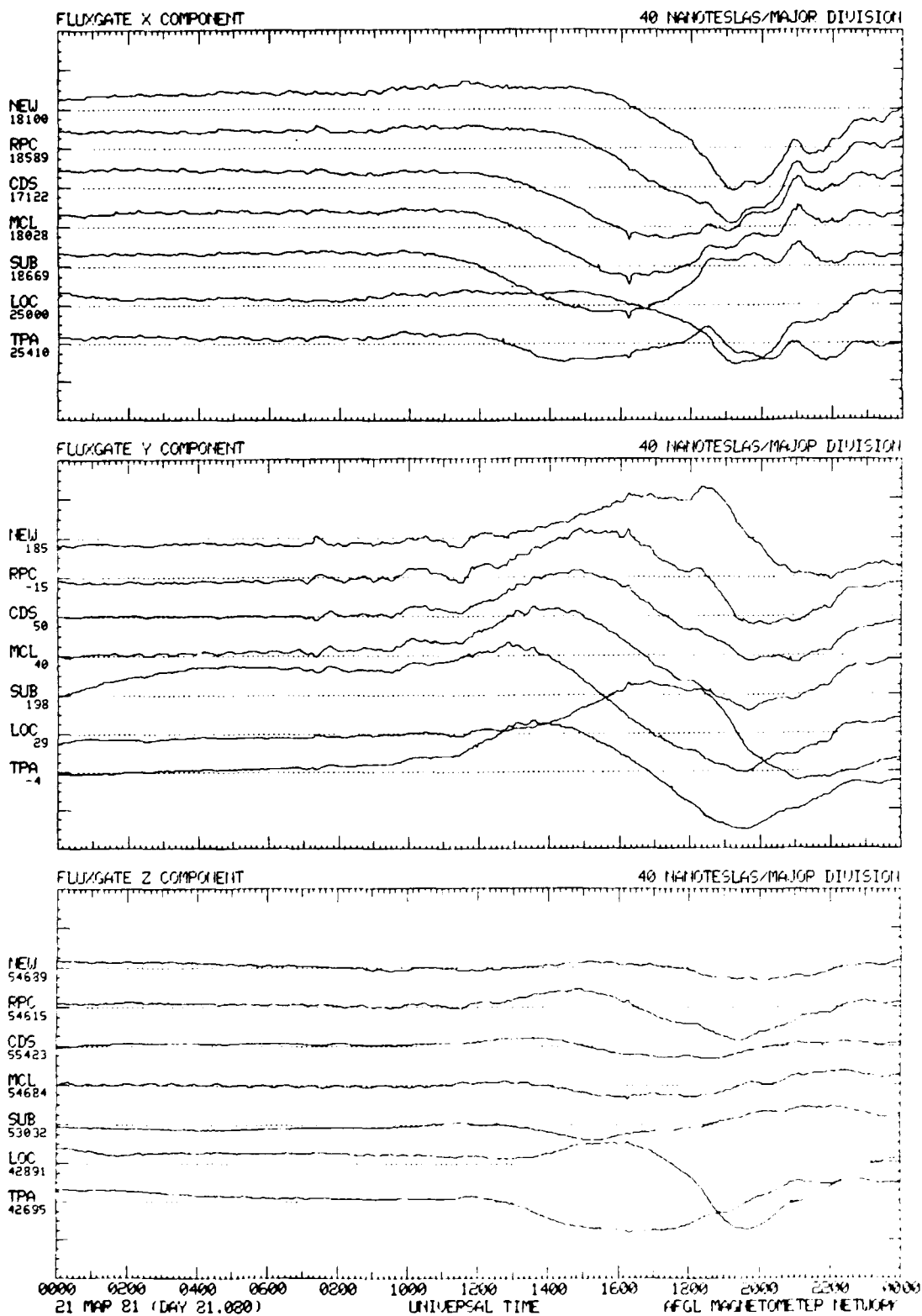


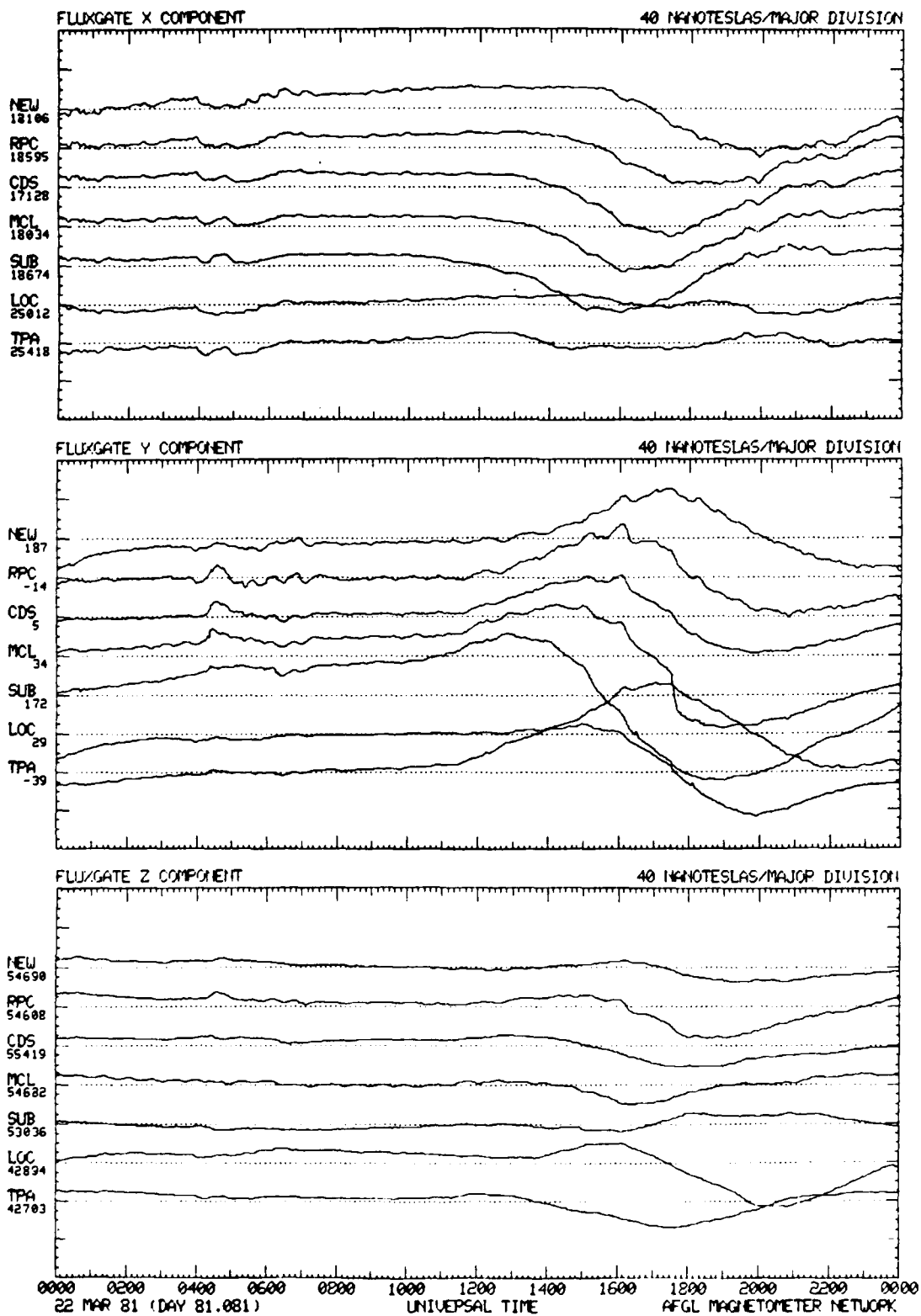


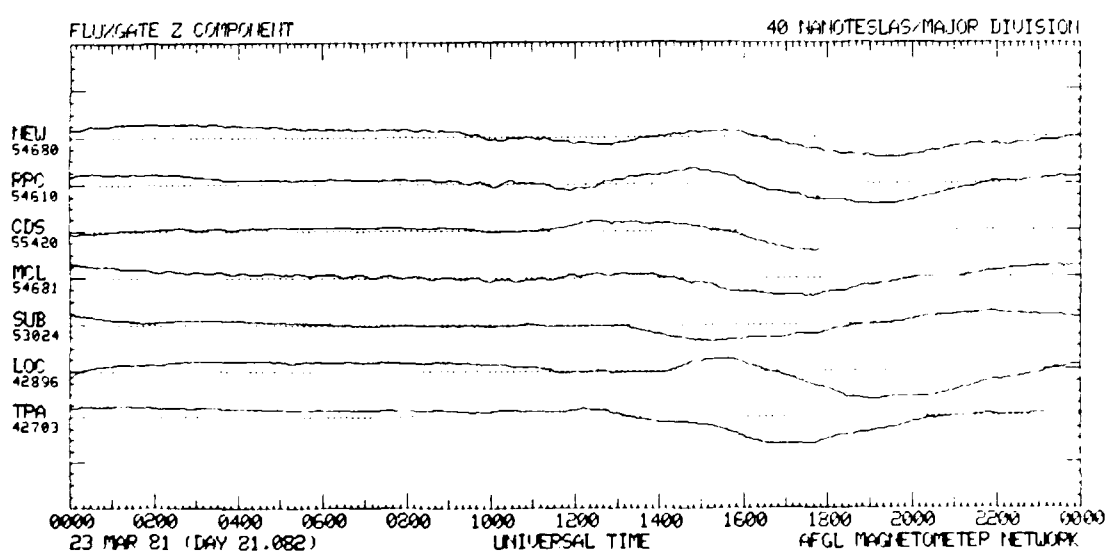
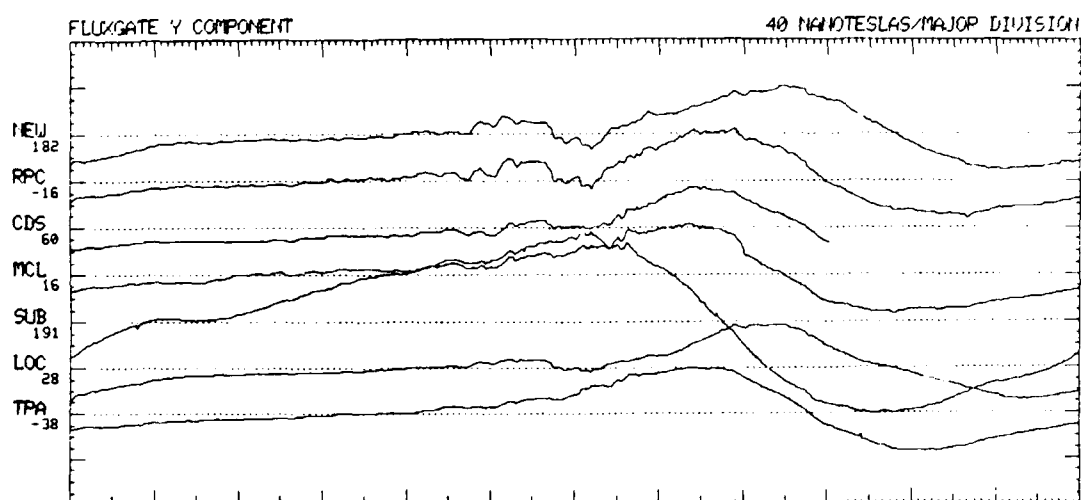
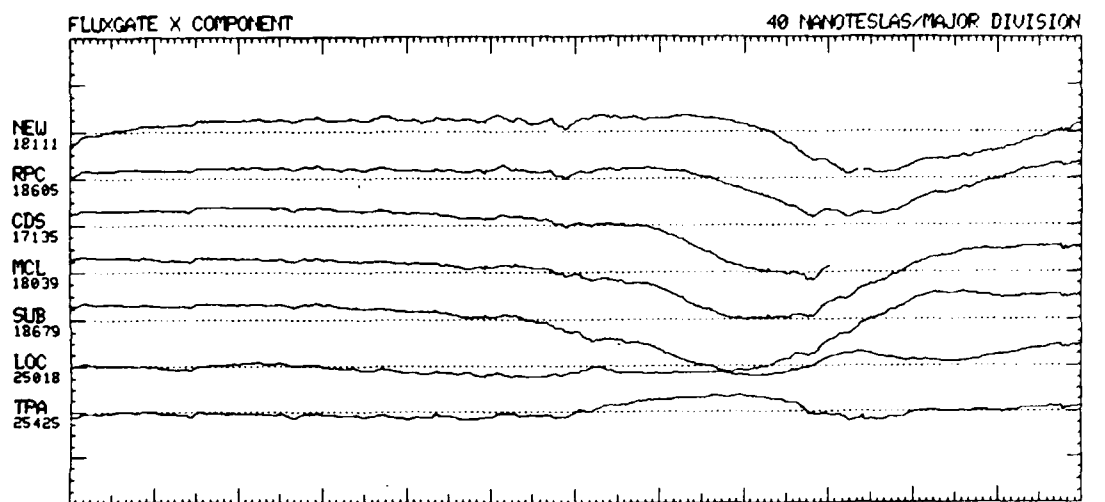


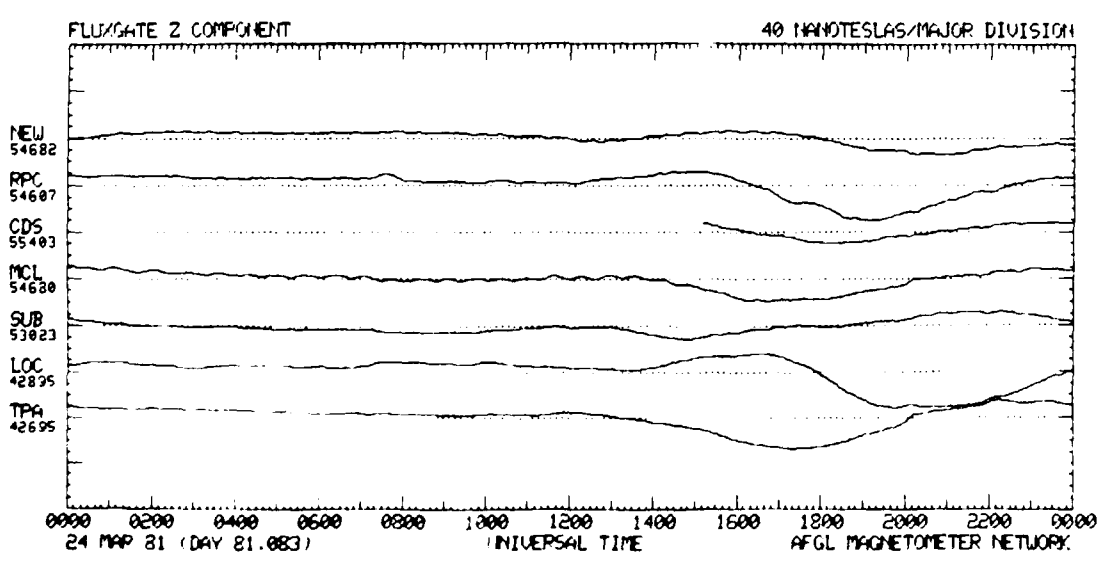
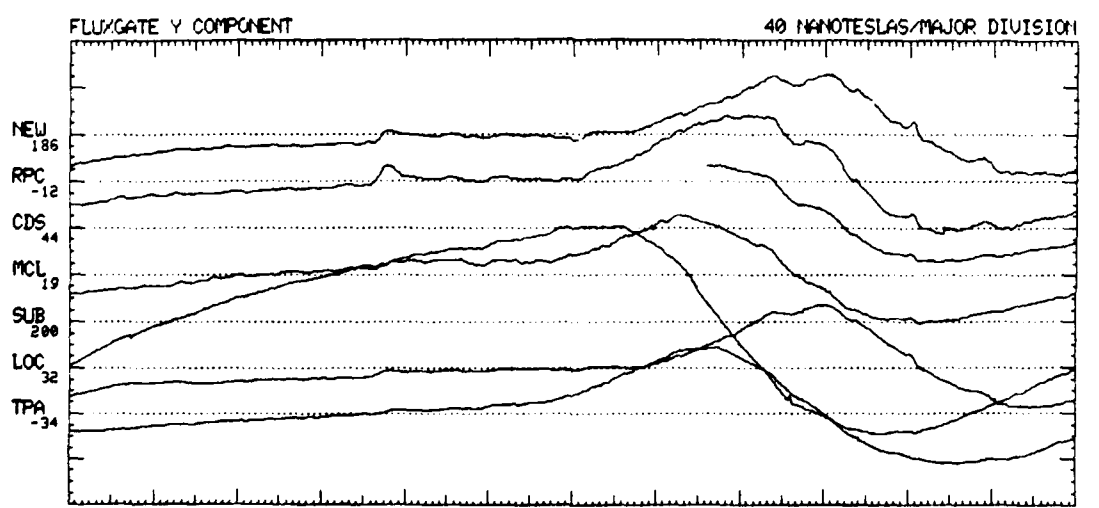
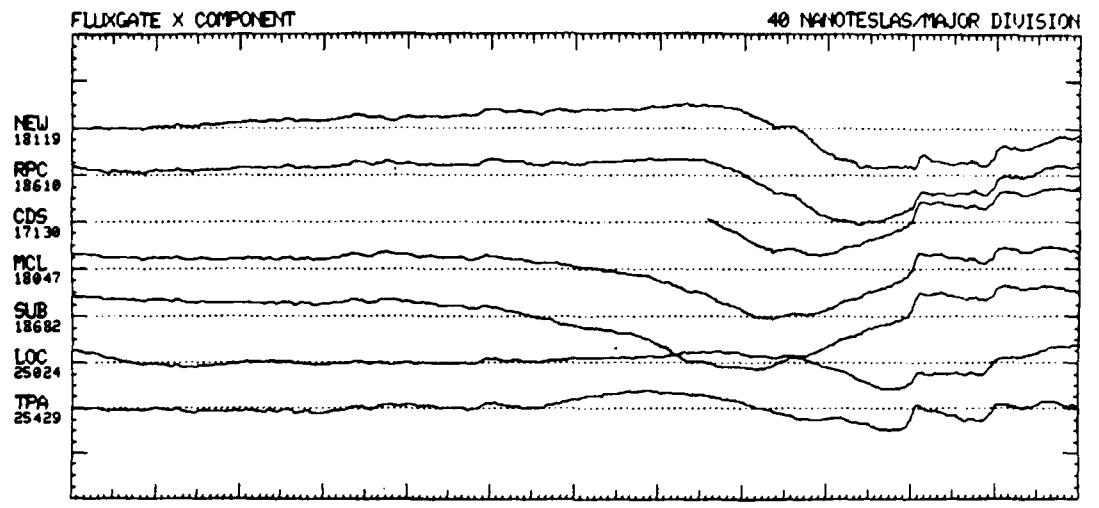


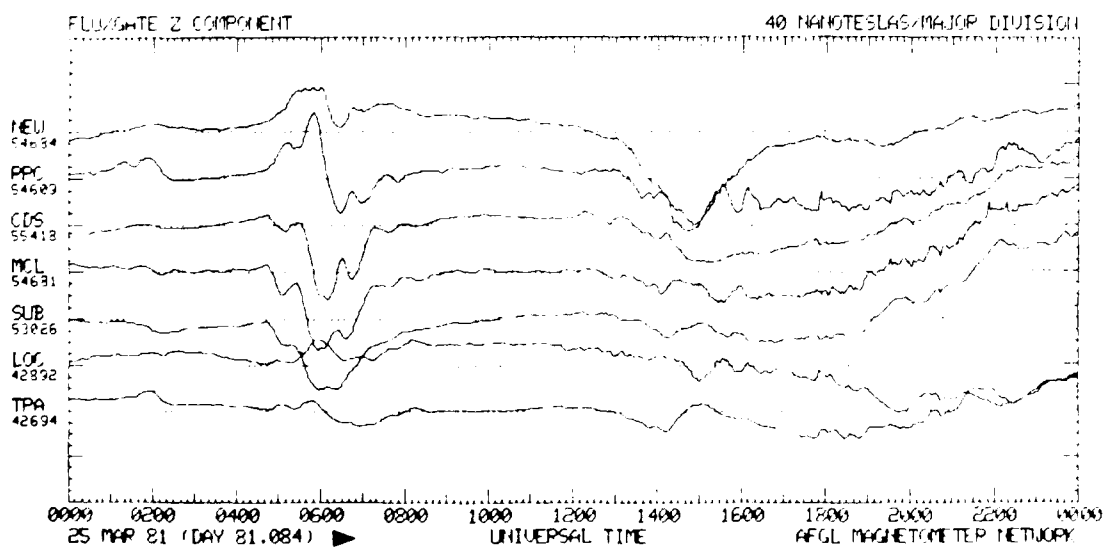
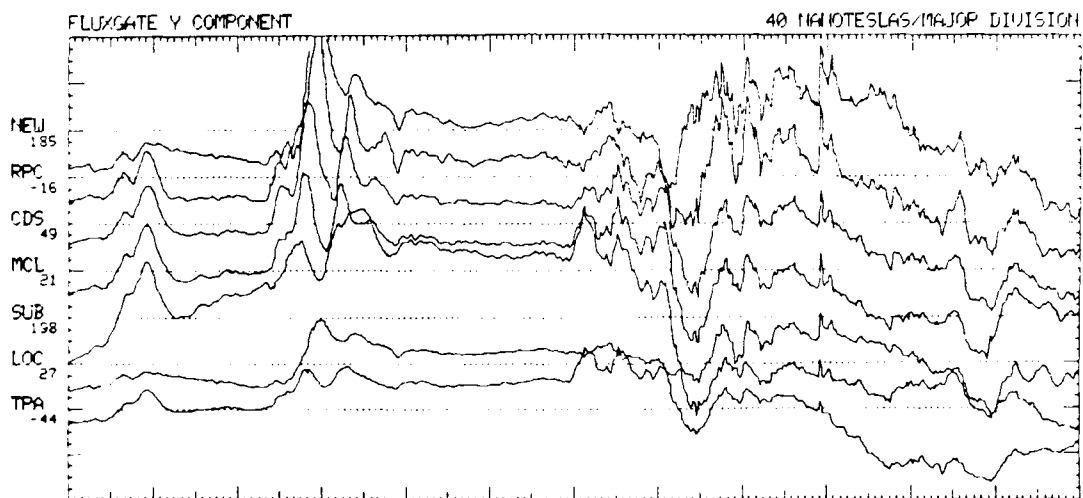
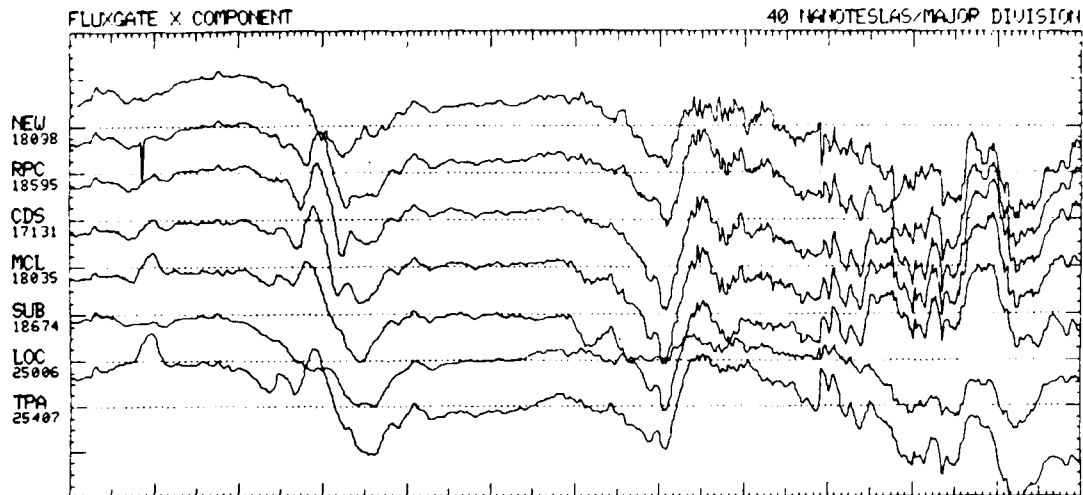












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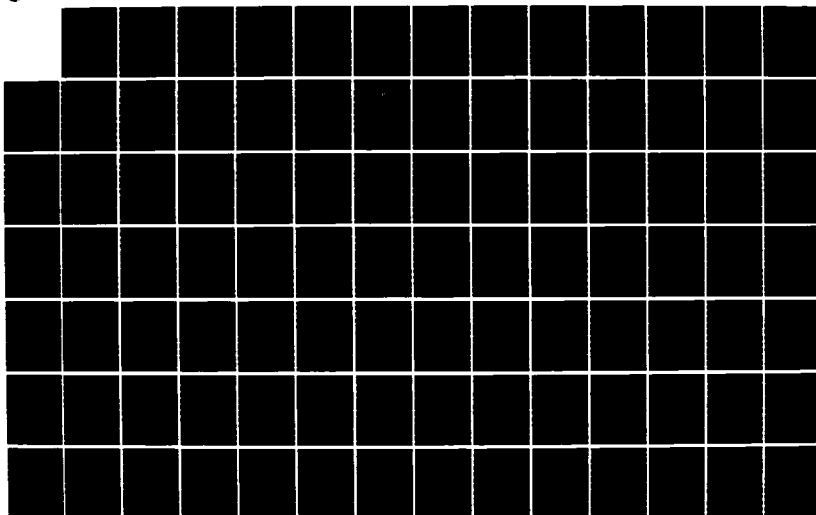
DAILY MAGNETOGRAMS FOR 1981 FROM THE AFGL (AIR FORCE  
GEOPHYSICS LABORATORY) NETWORK(U) AIR FORCE GEOPHYSICS  
LAB HANSCOM AFB MA D J KNECHT 28 FEB 85  
AFGL-TR-85-0030

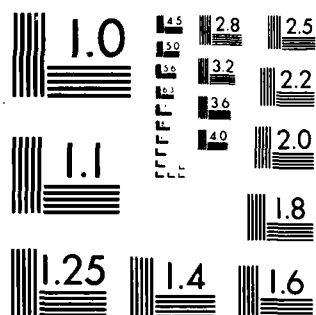
2/5

UNCLASSIFIED

F/G 4/1

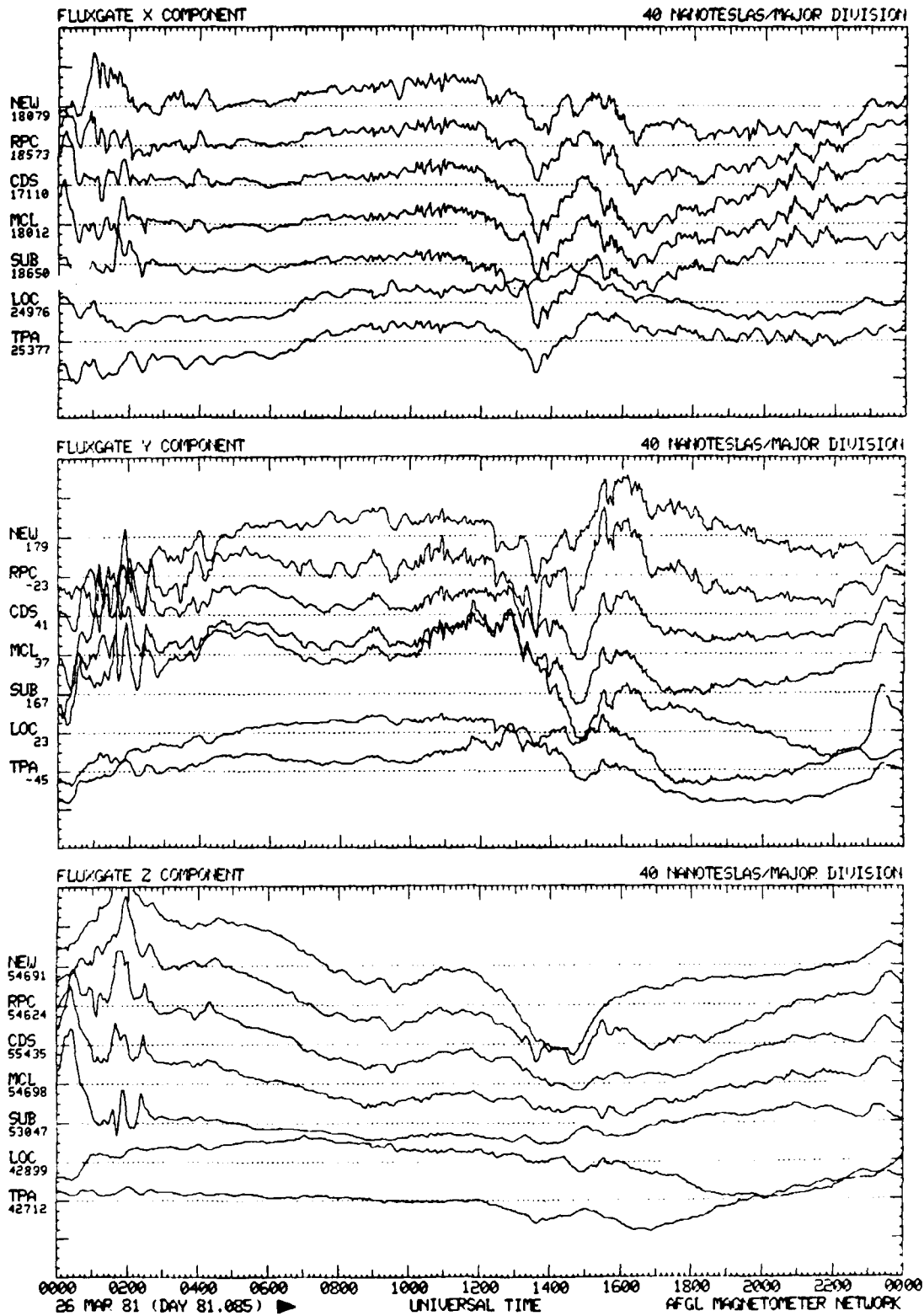
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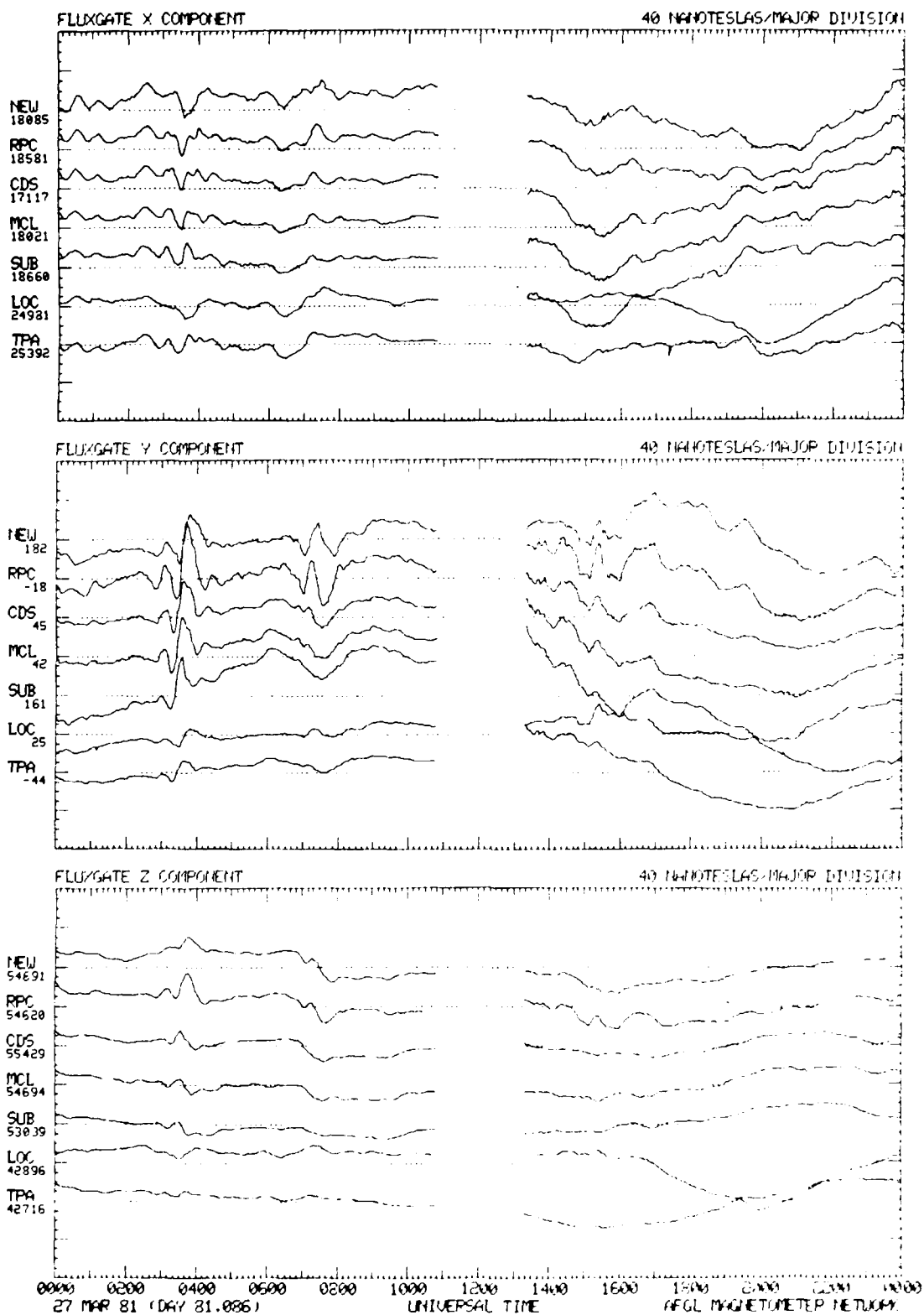


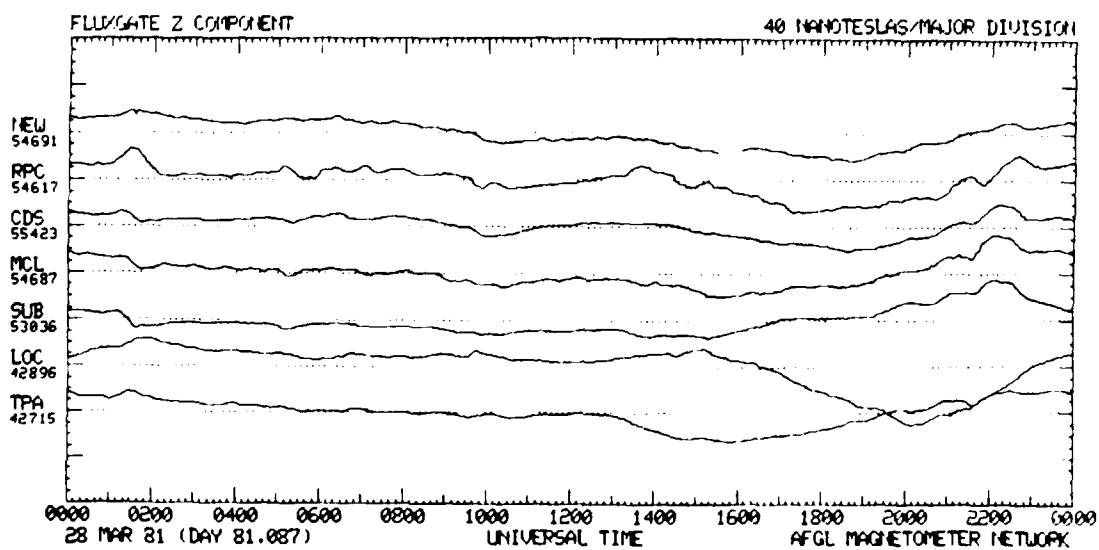
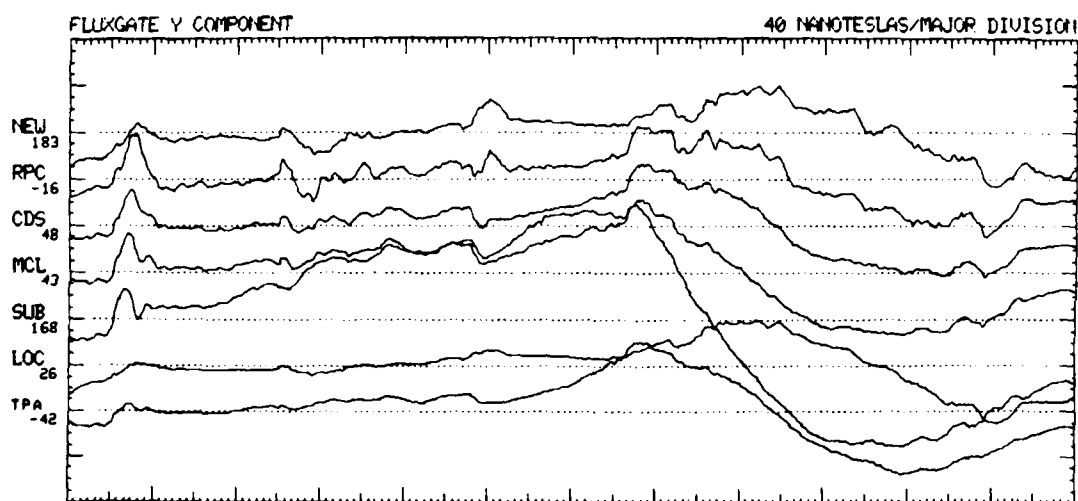
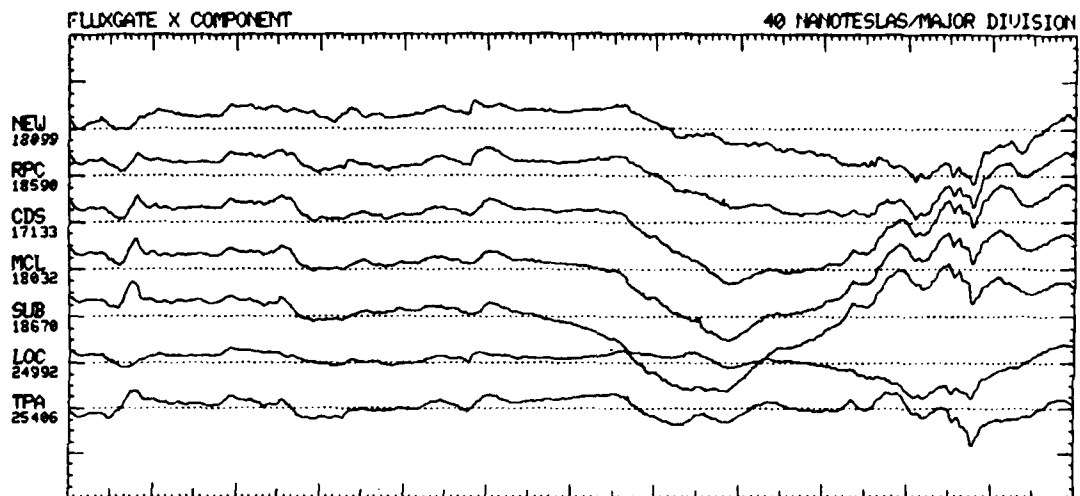


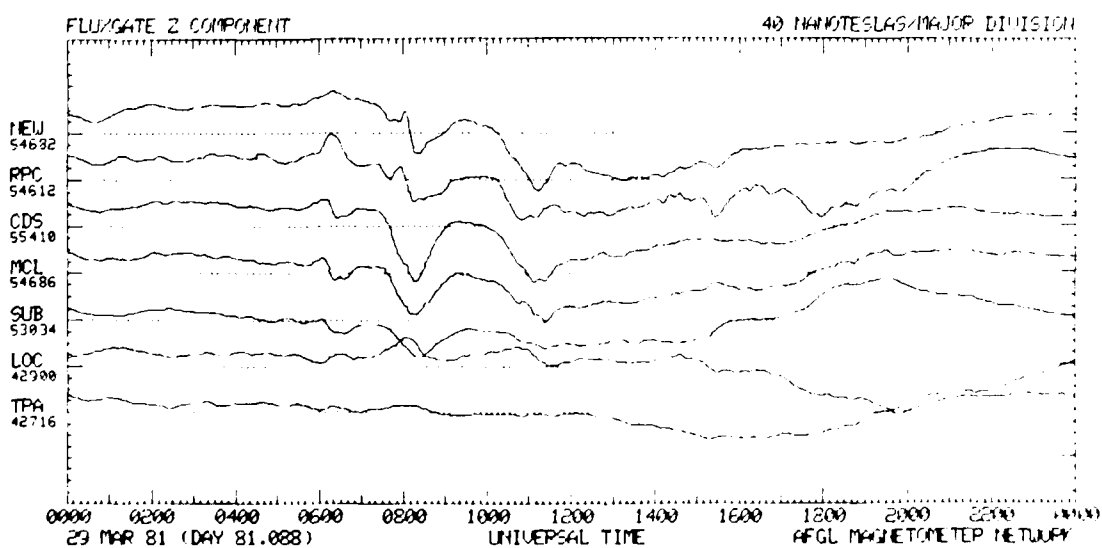
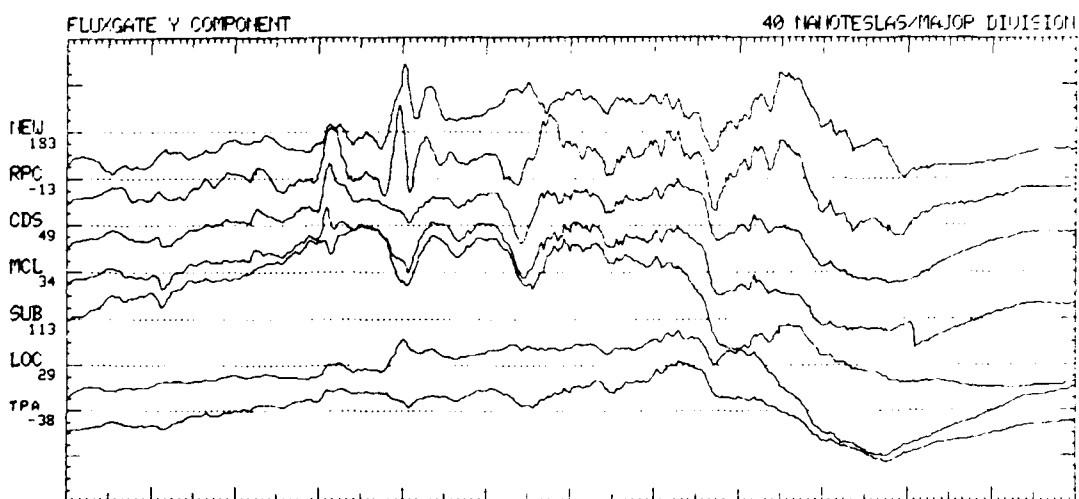
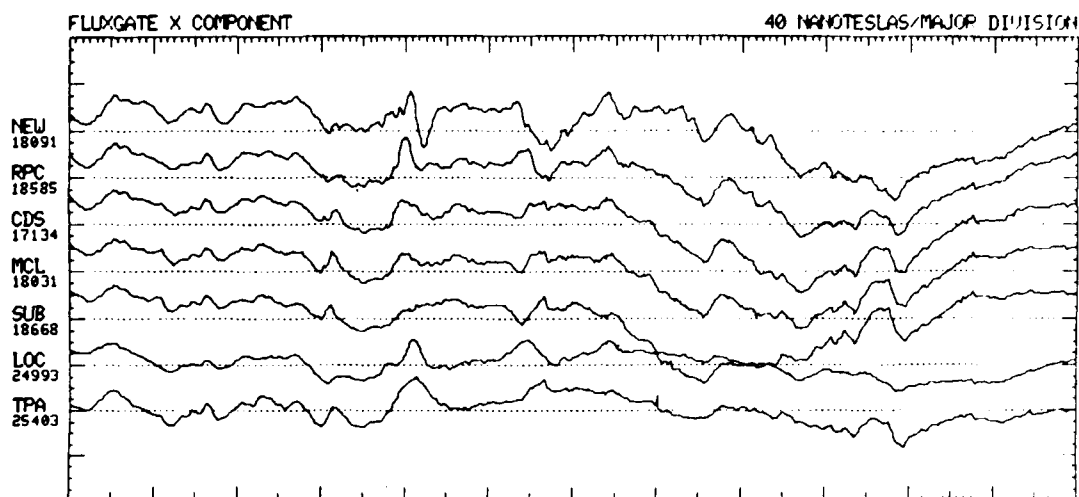
MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A



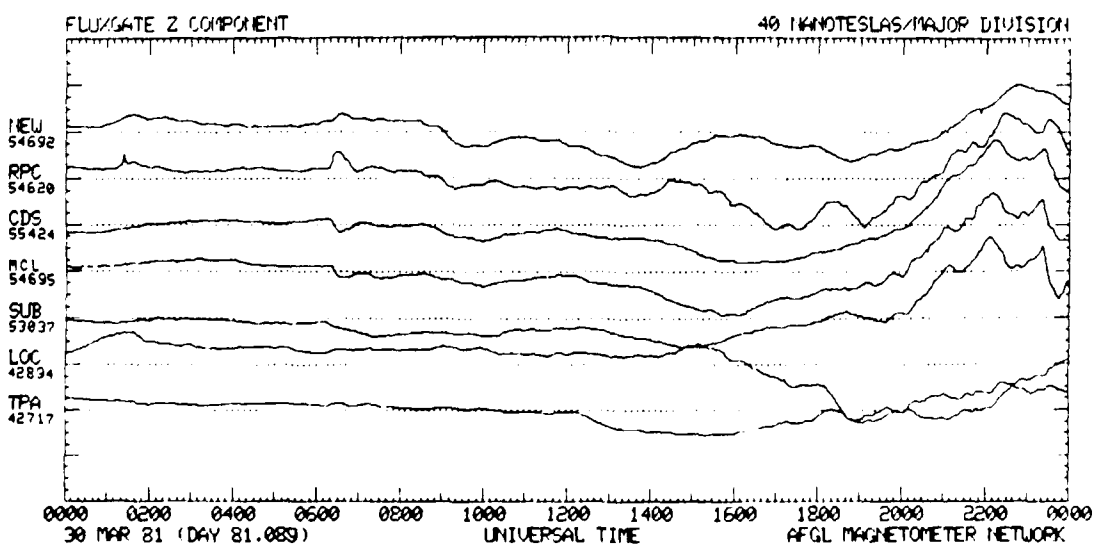
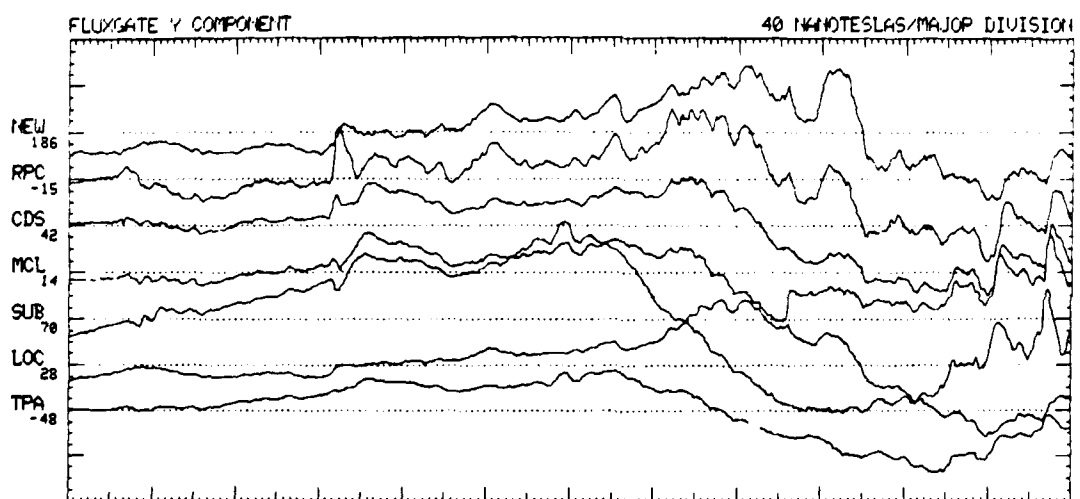
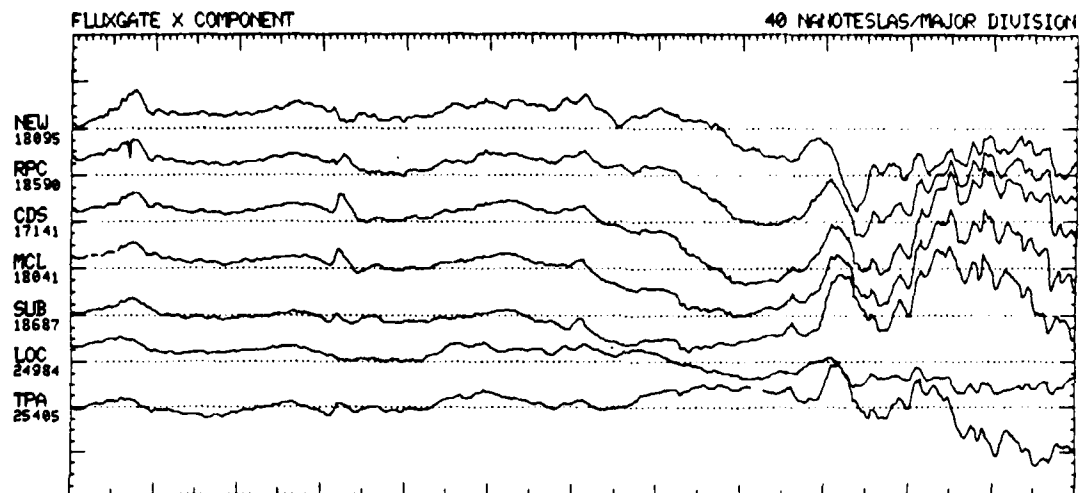


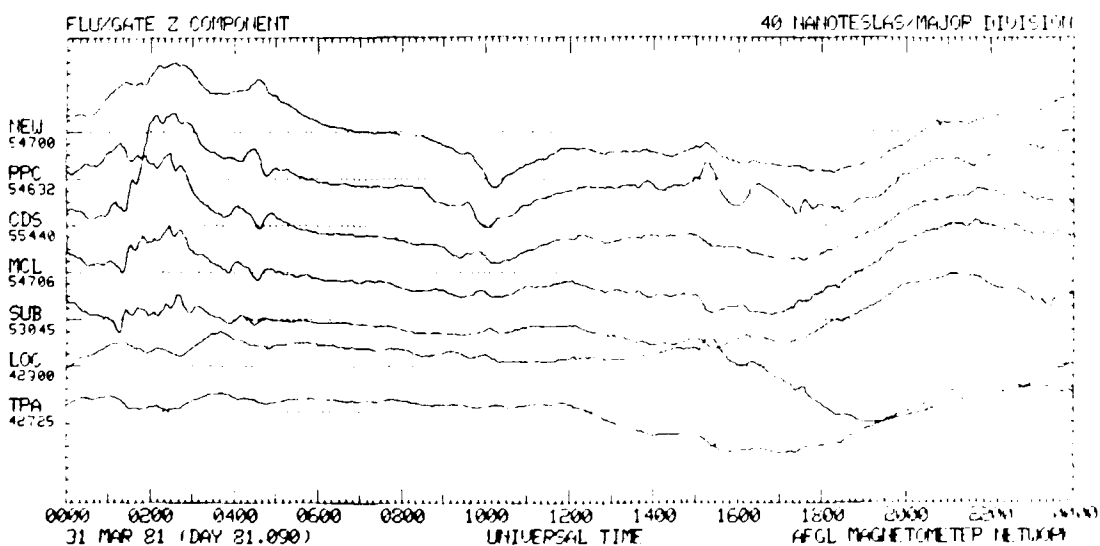
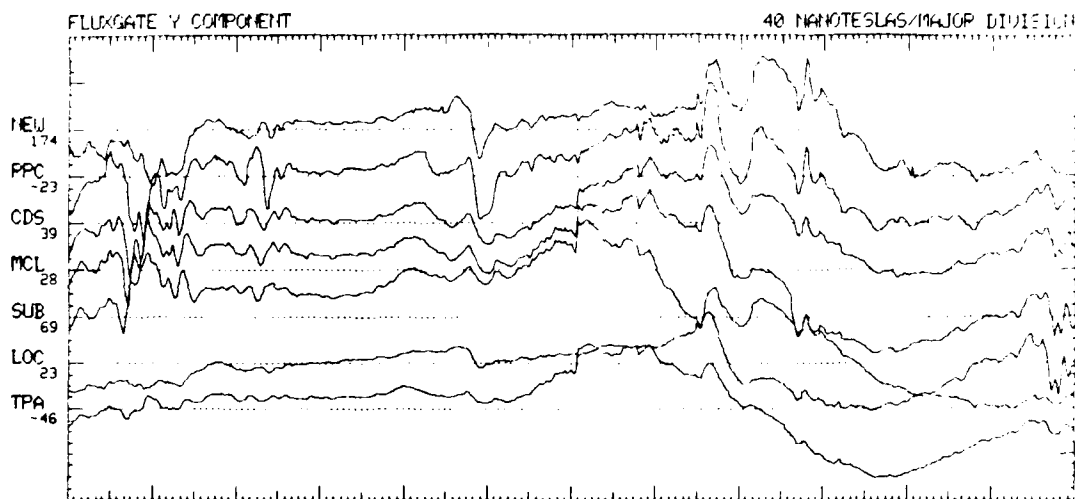
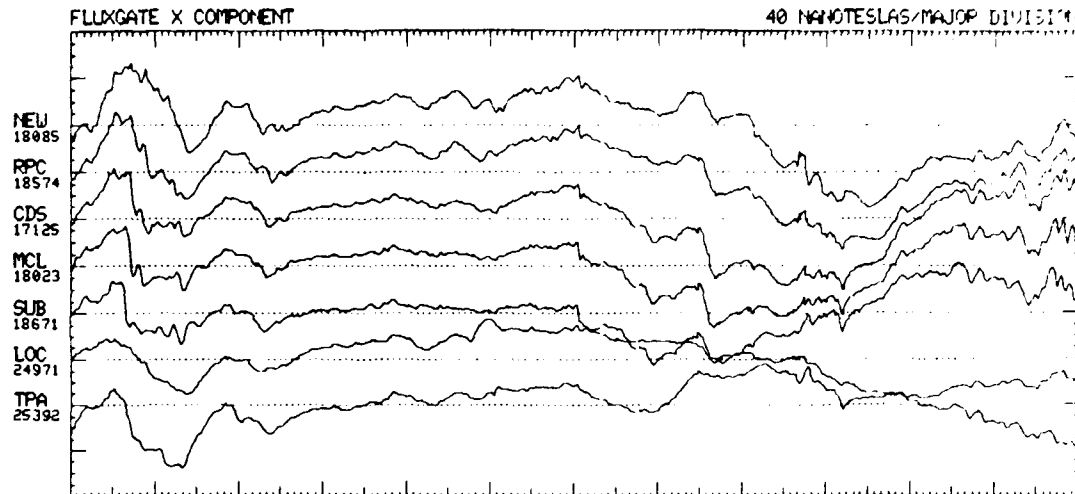


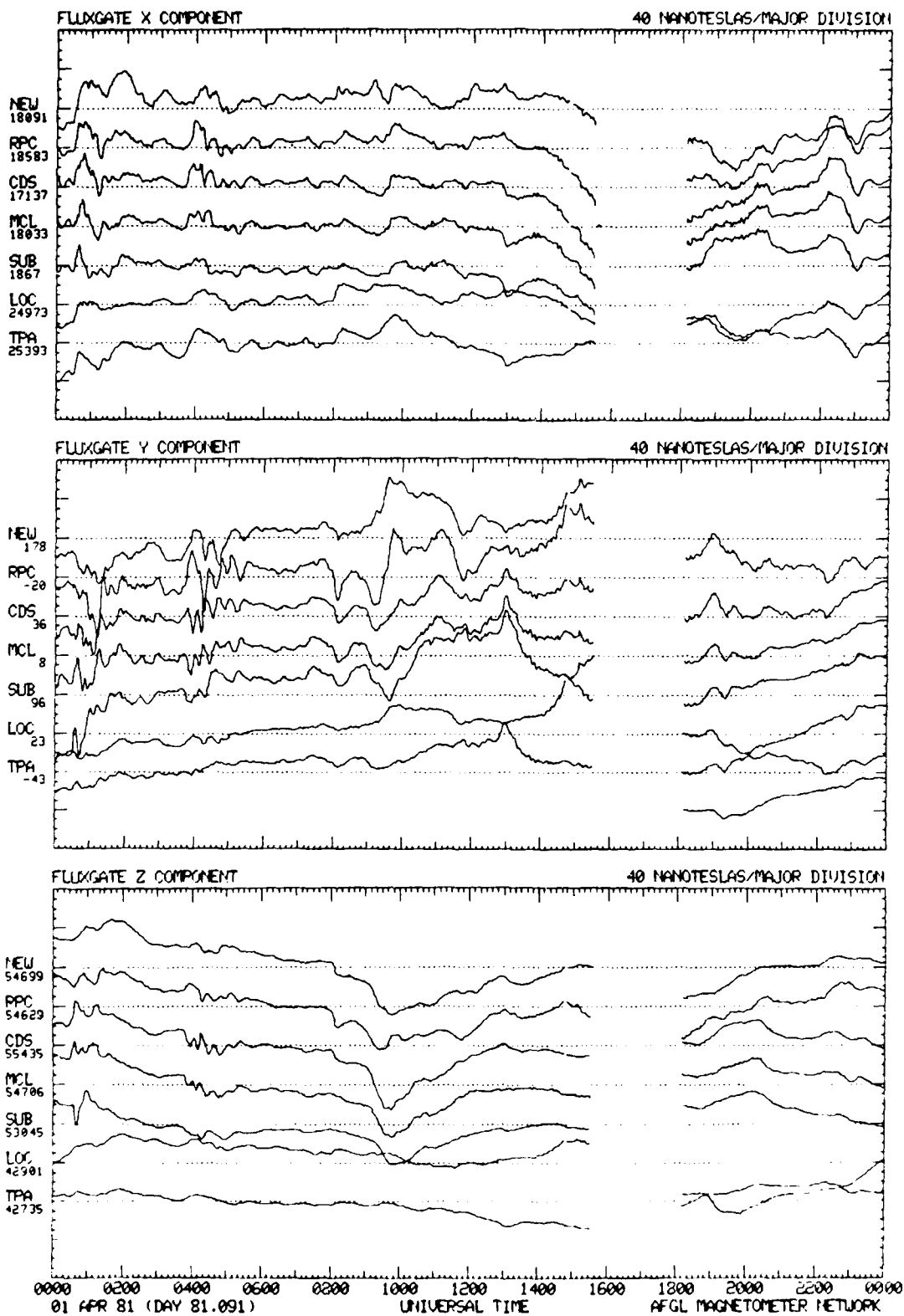


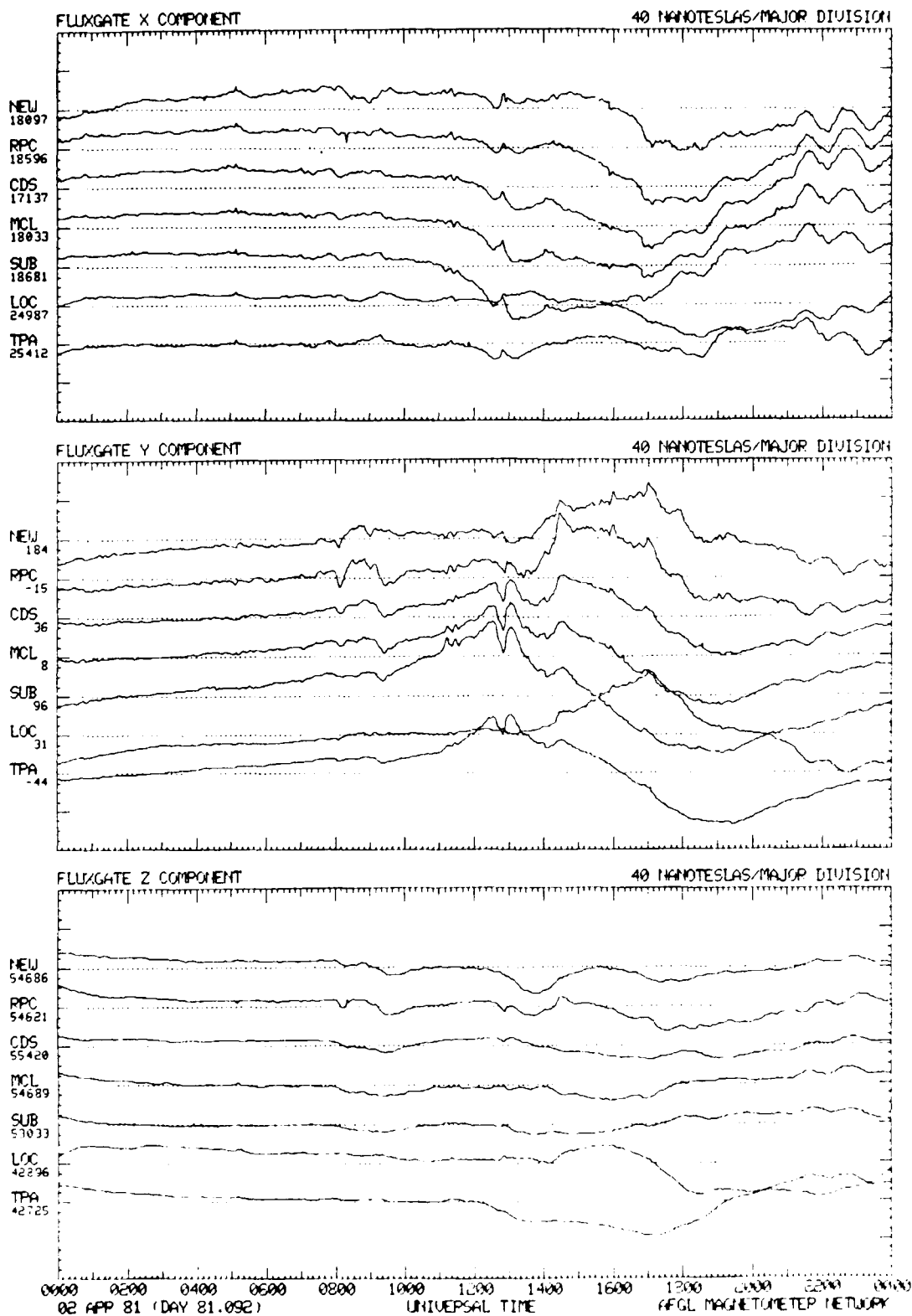


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29 MAR 81 (DAY 81.088) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

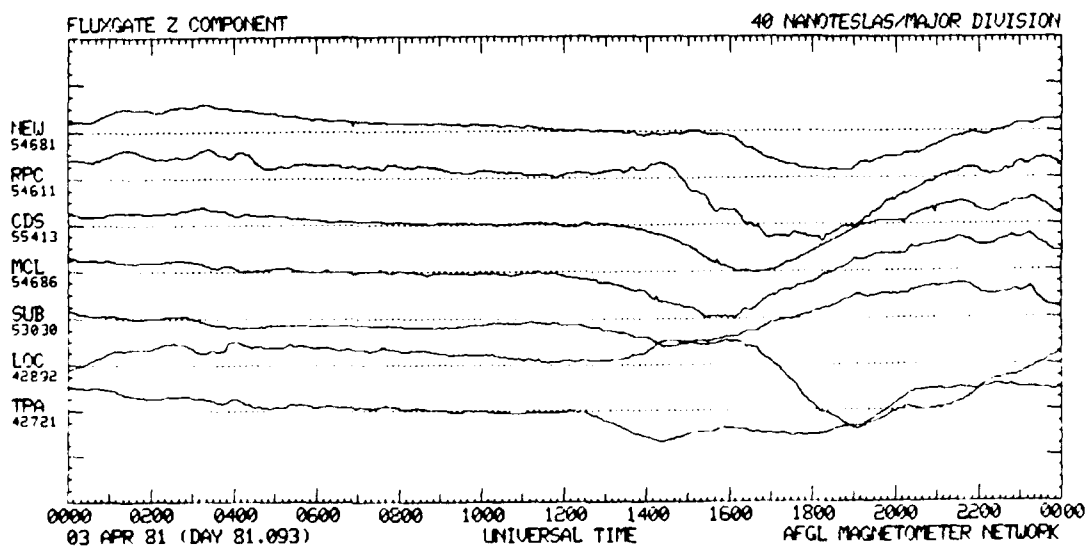
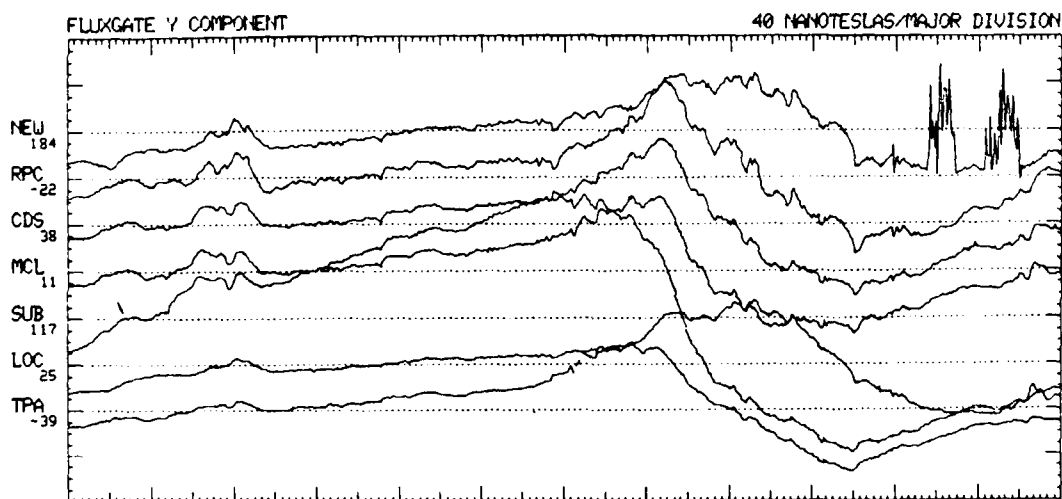
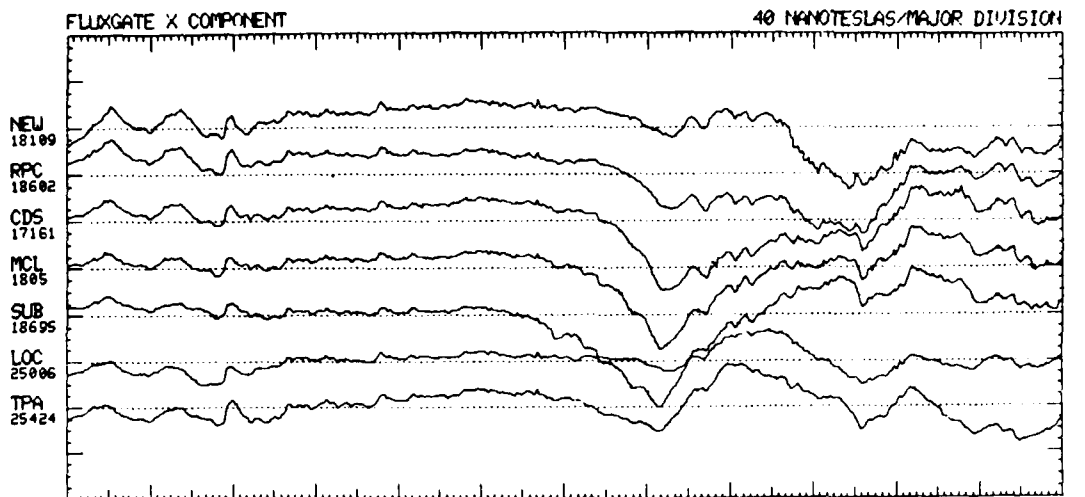


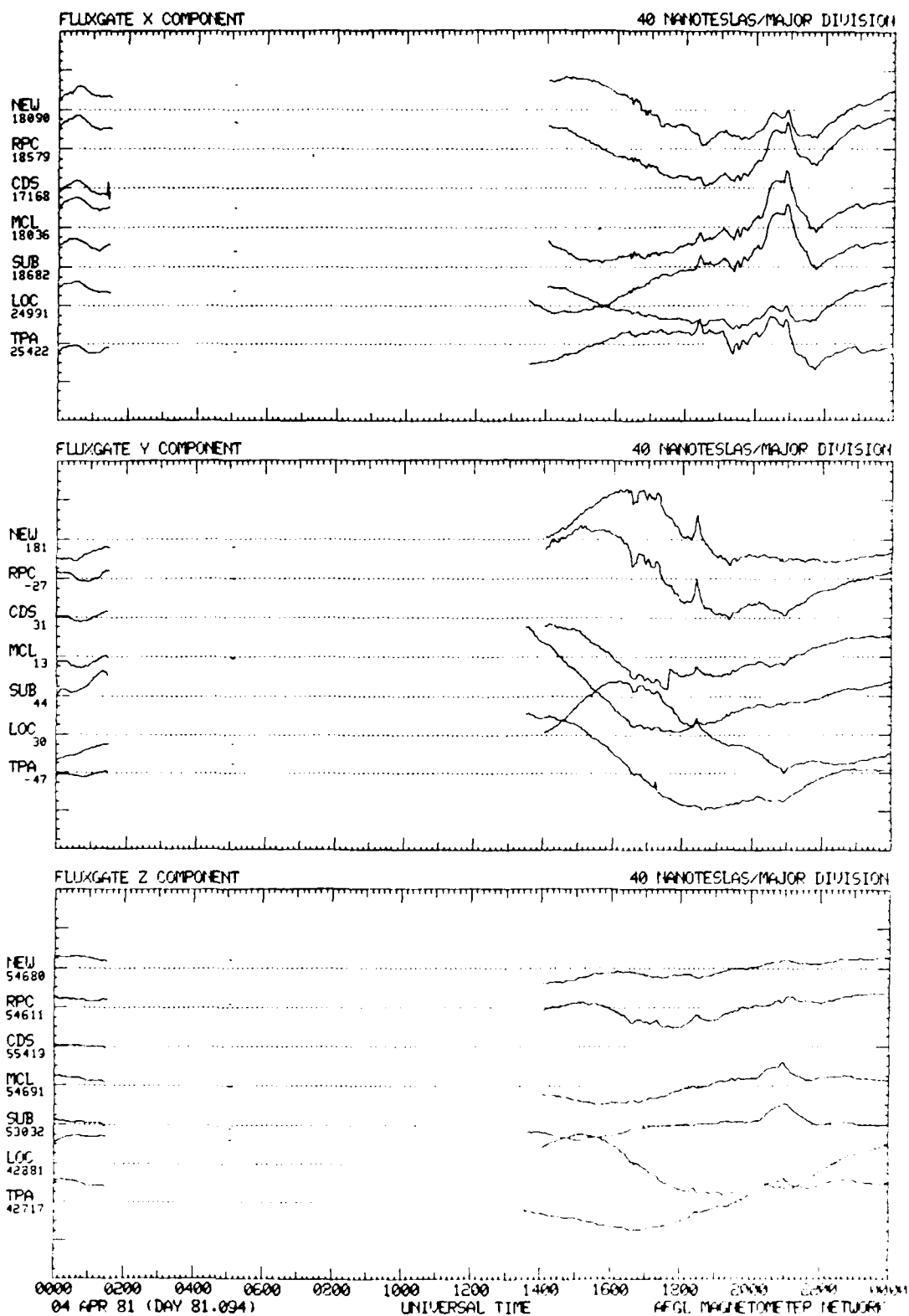


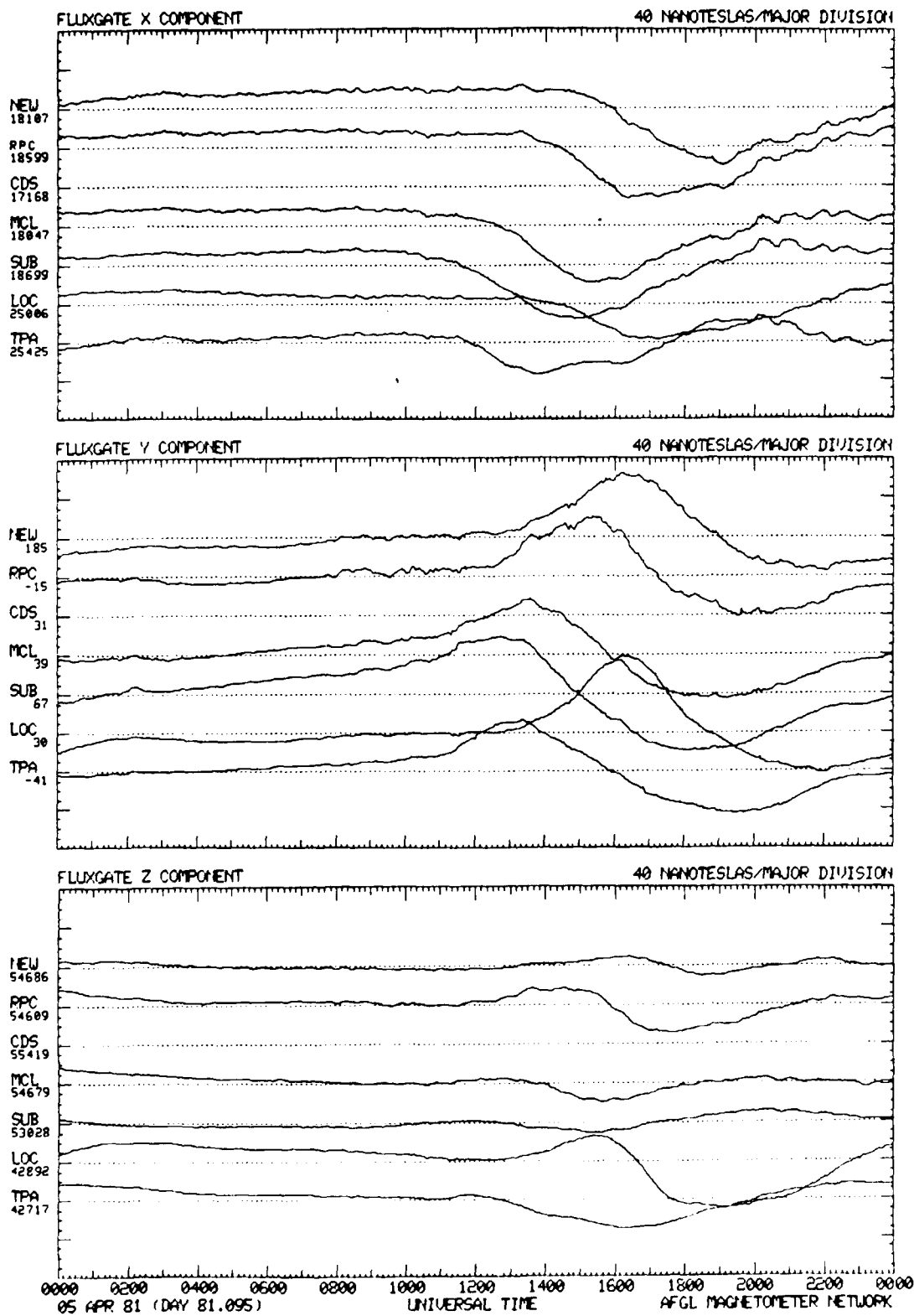


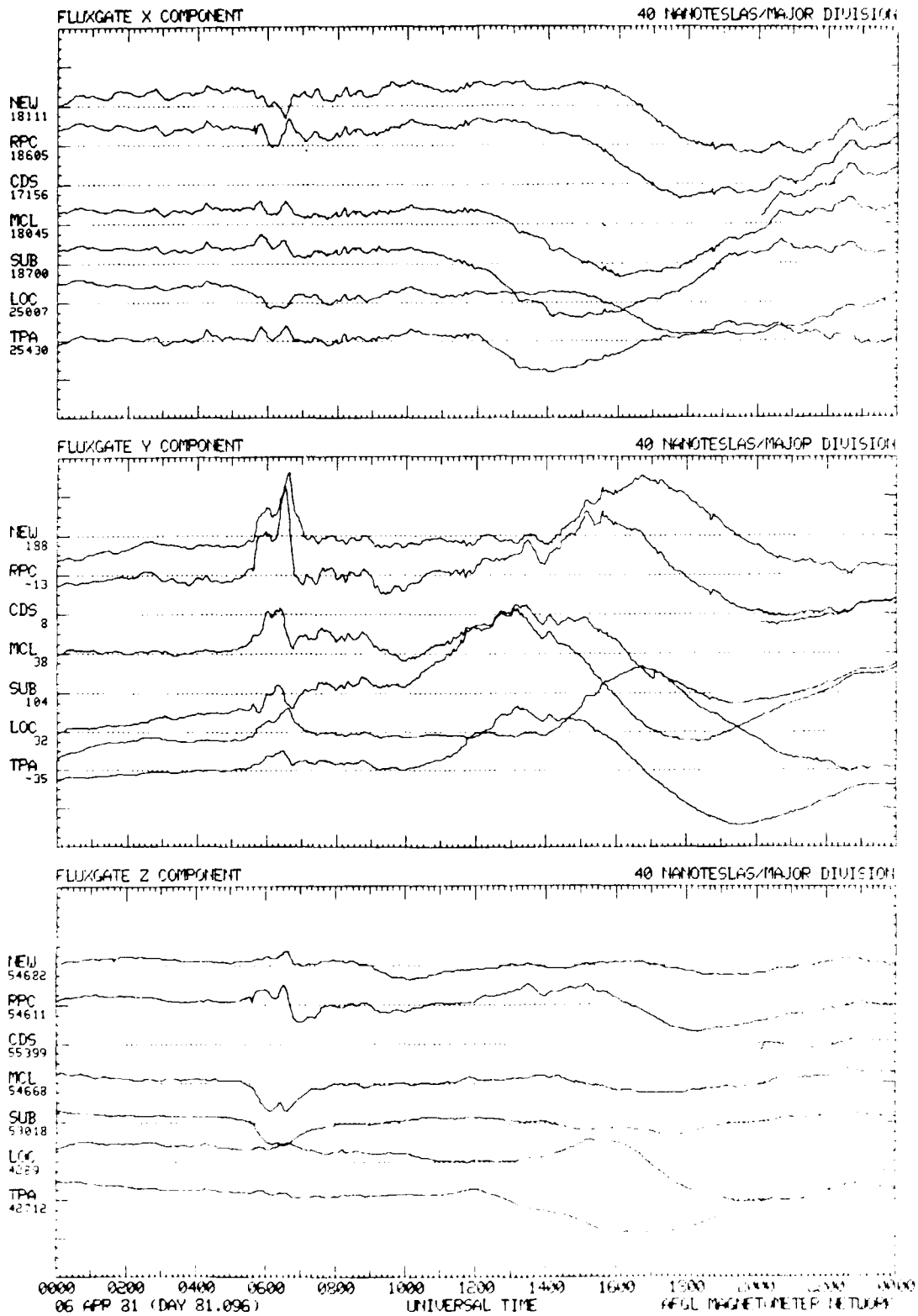


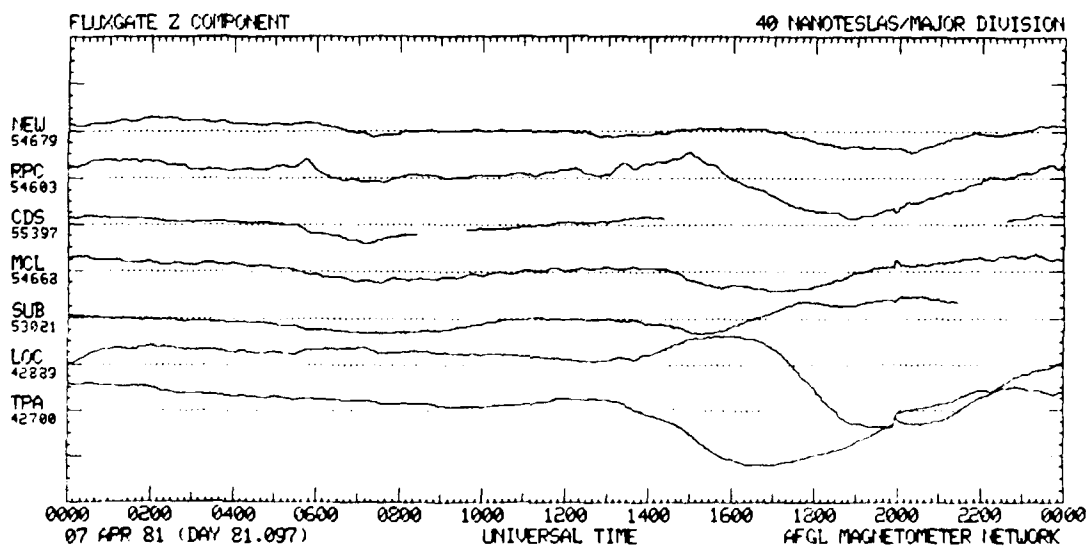
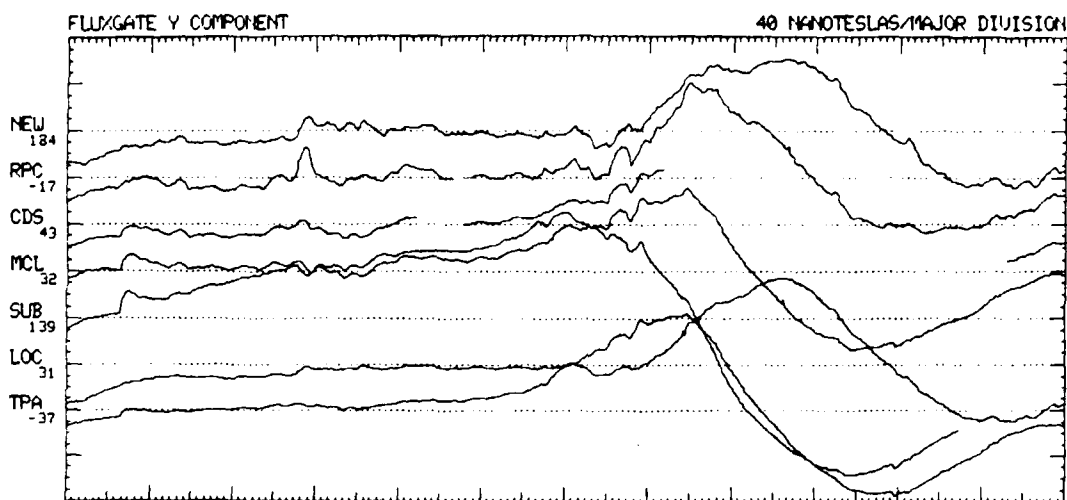
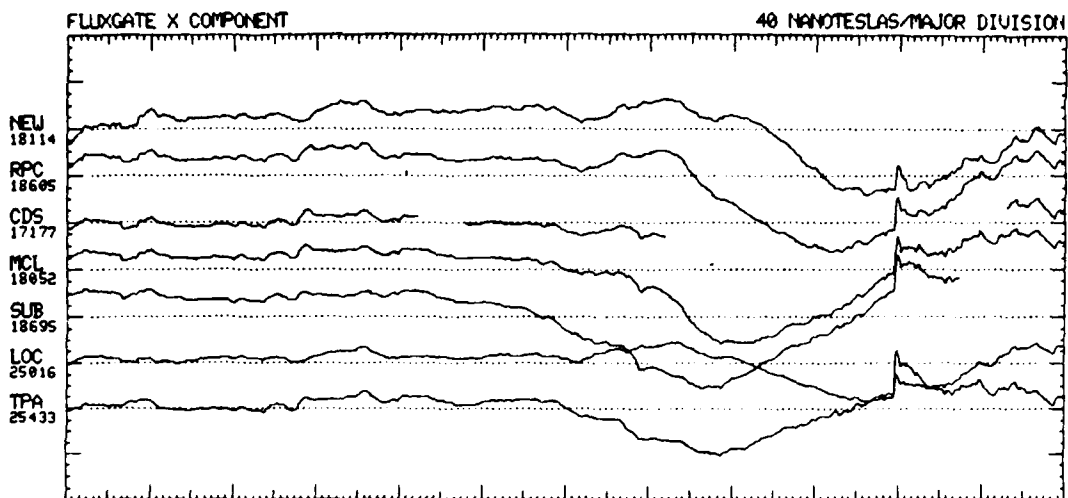


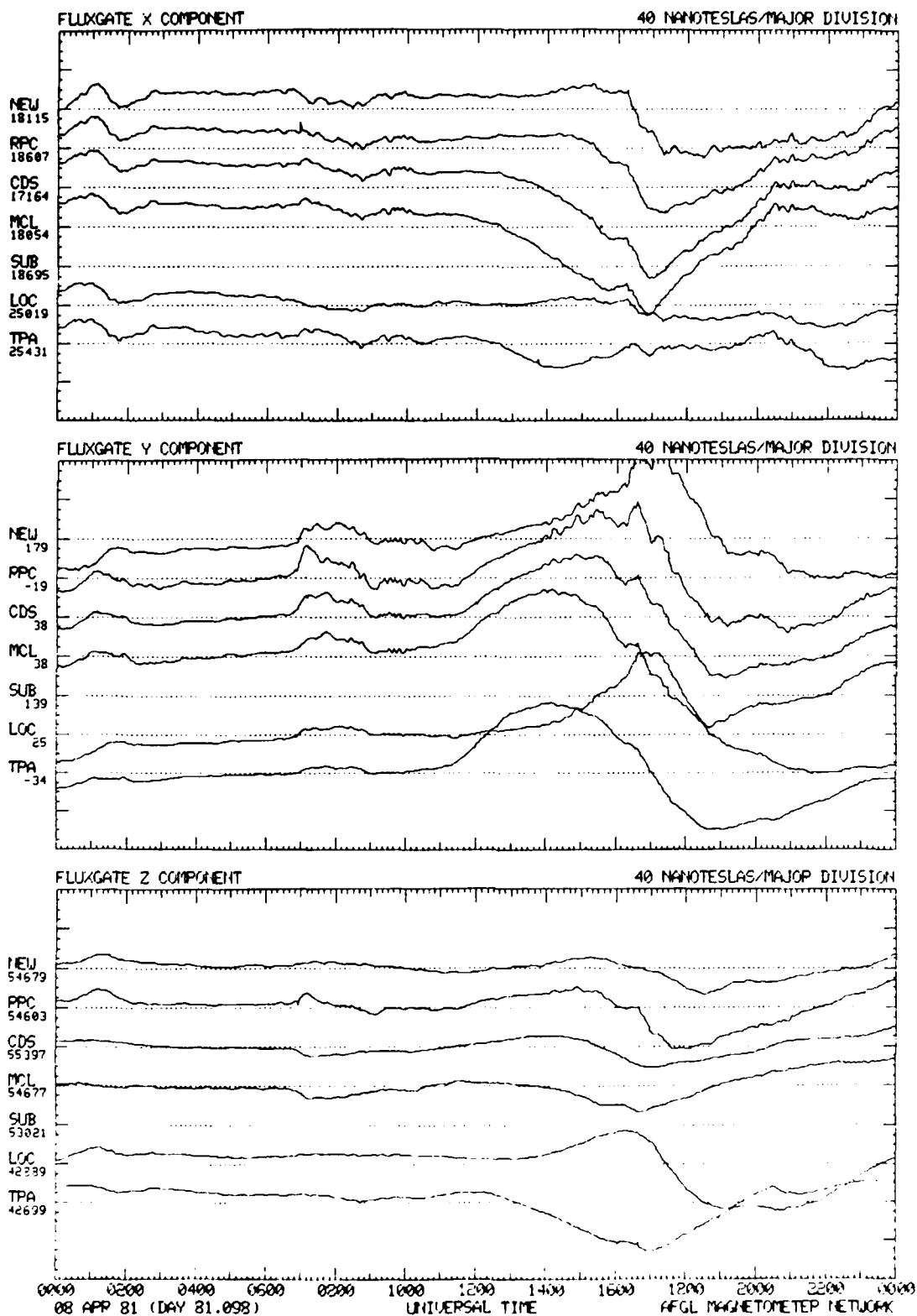


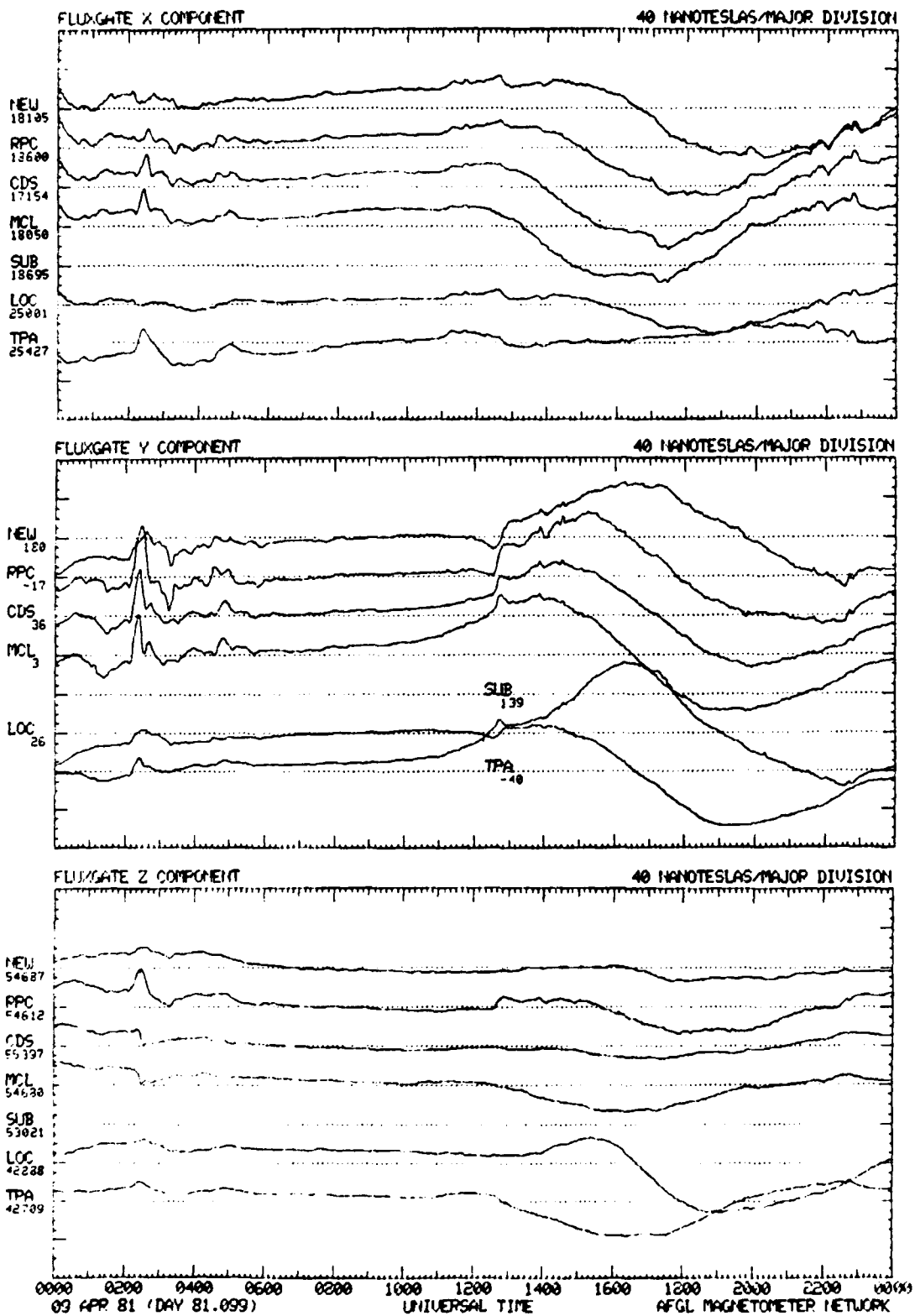


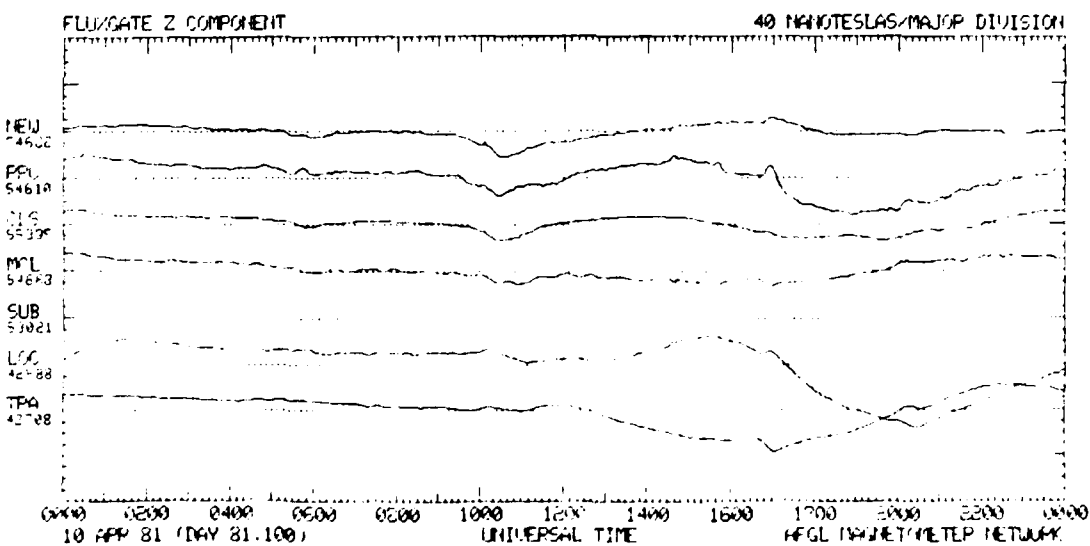
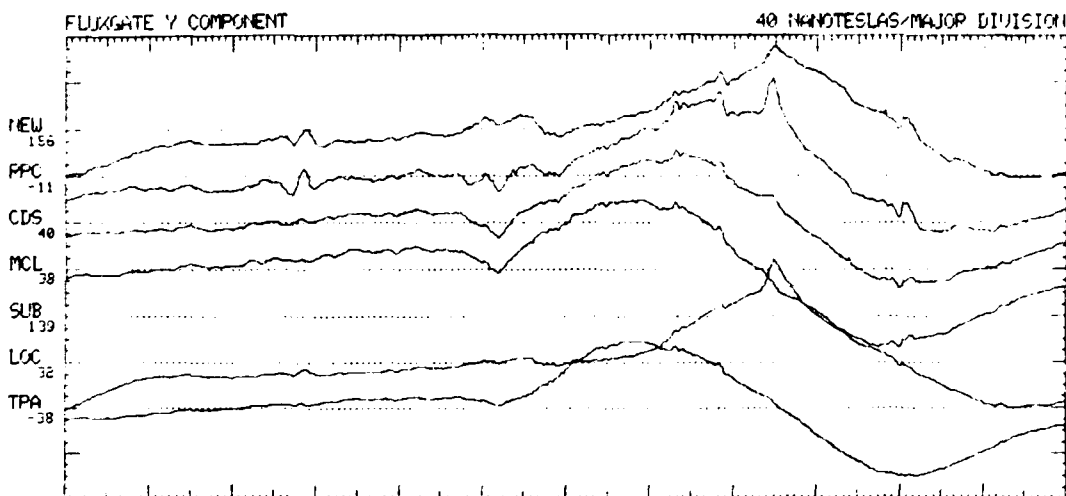
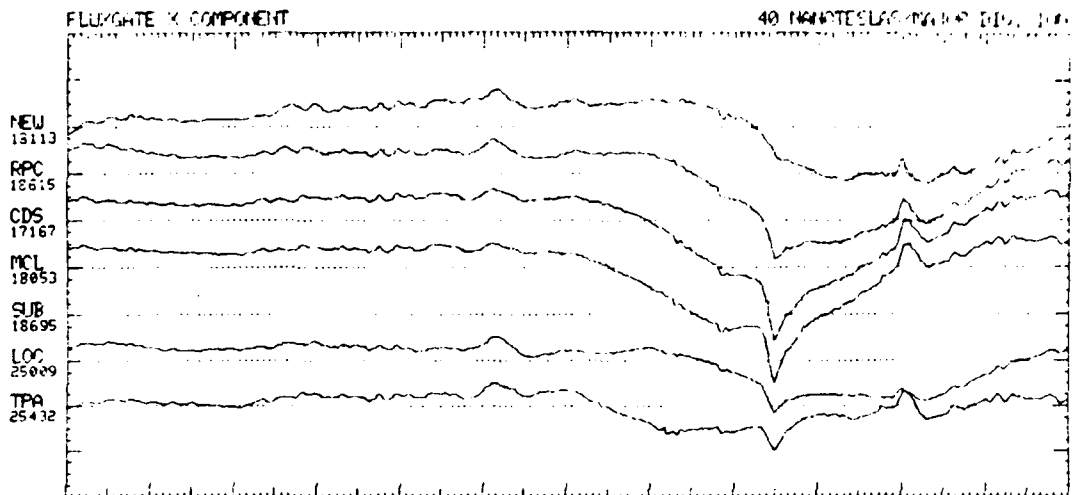




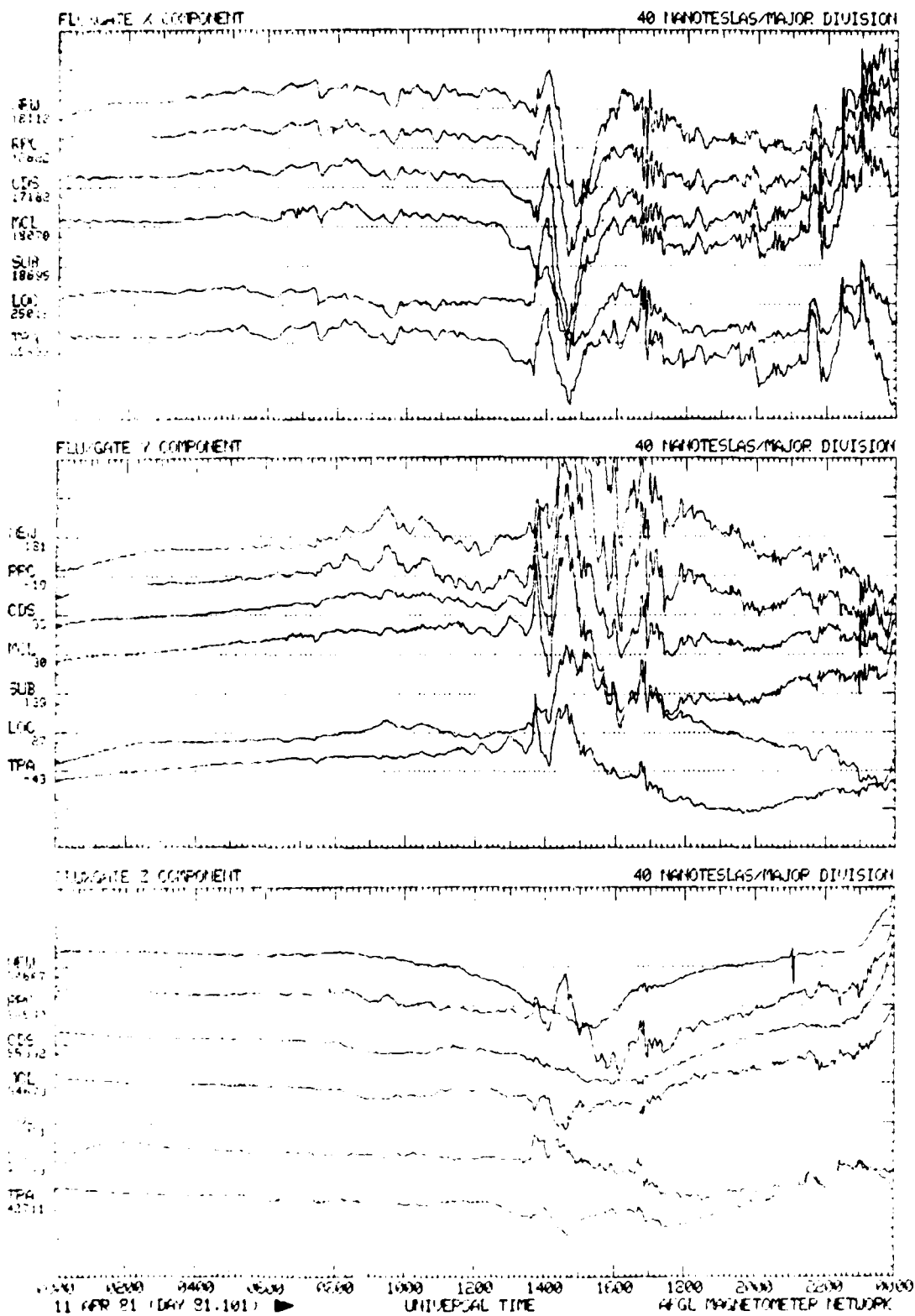


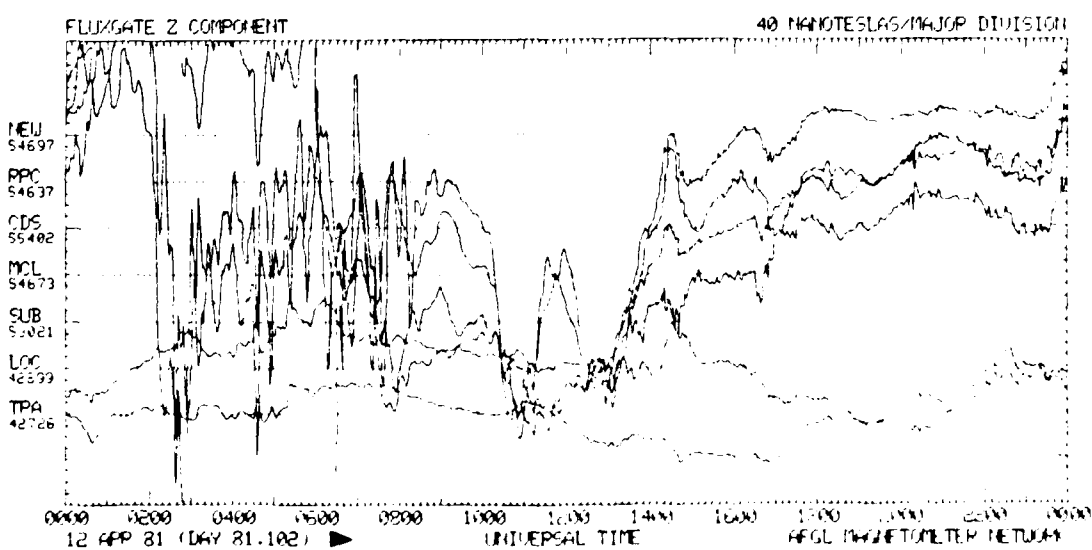
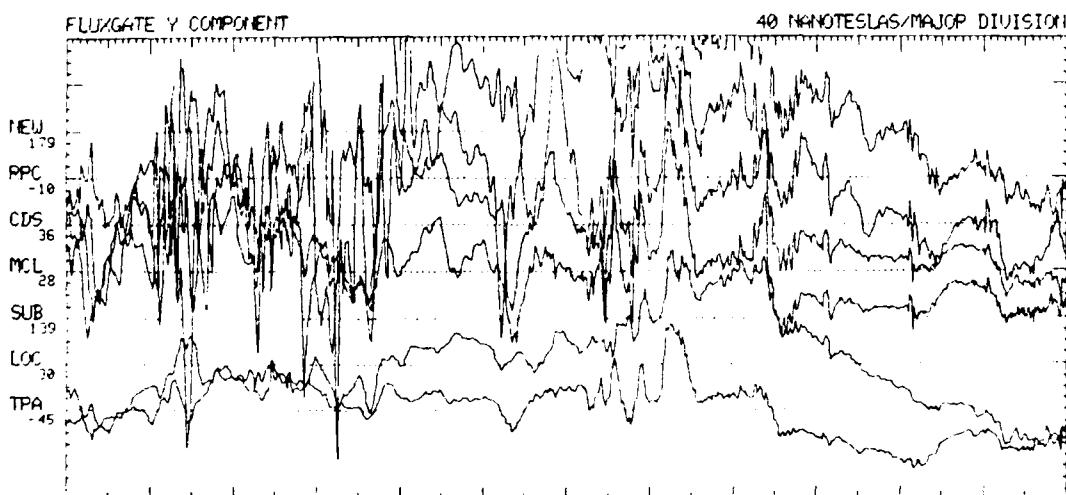
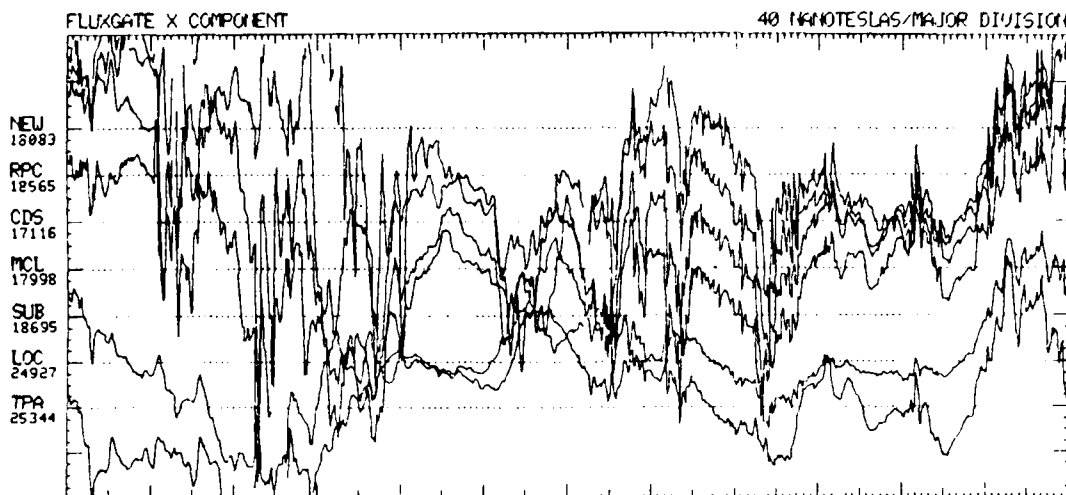


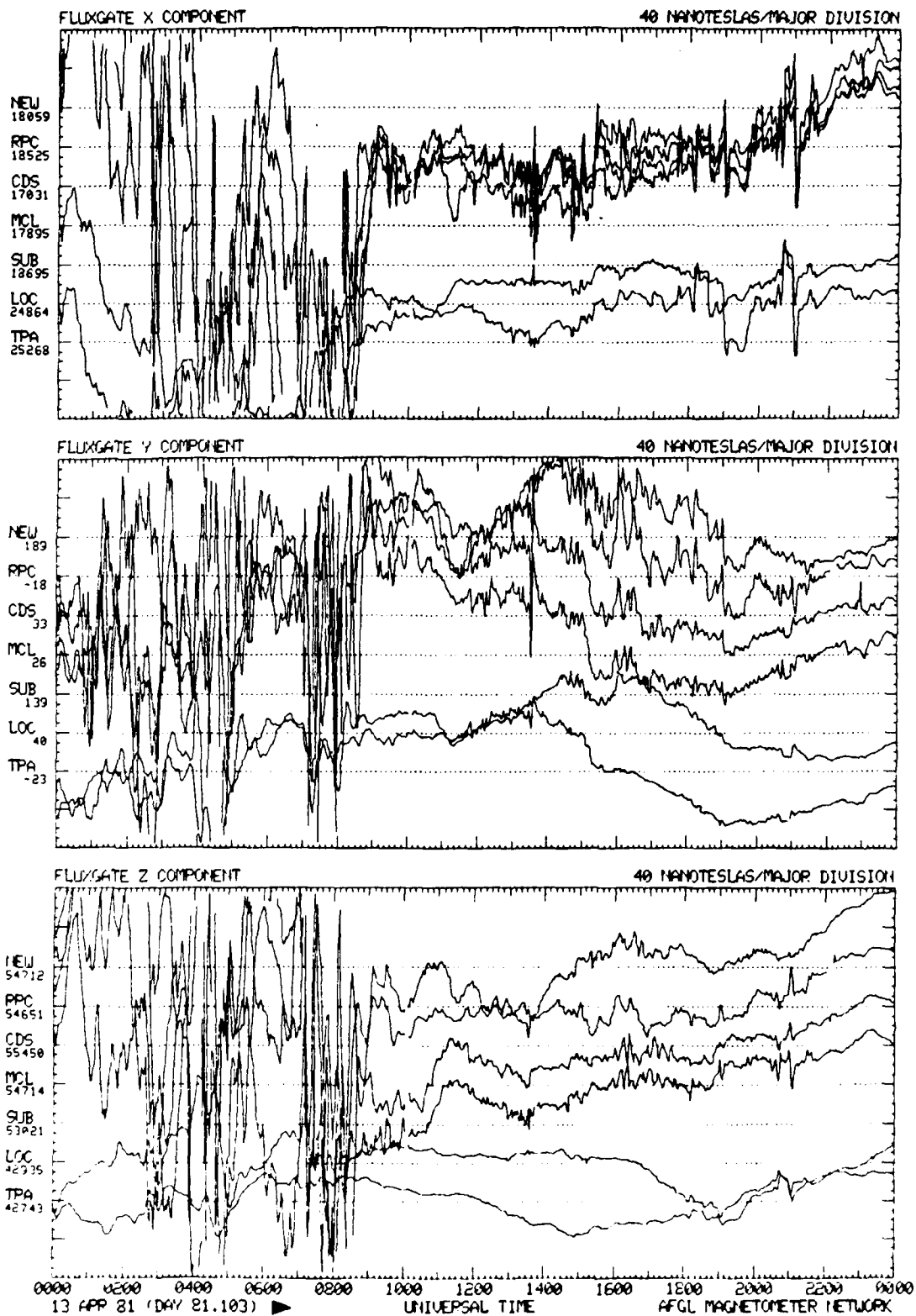


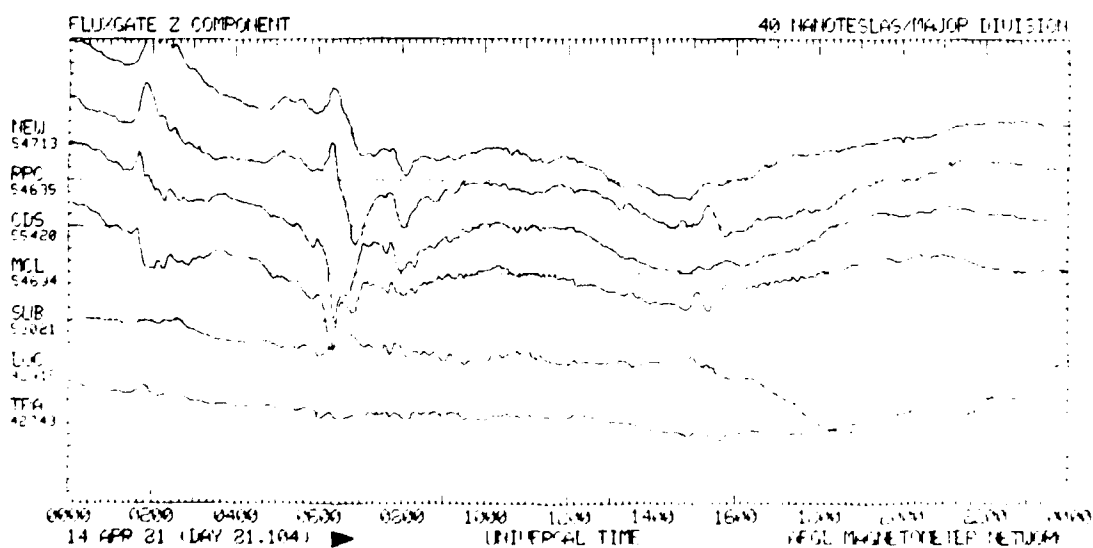
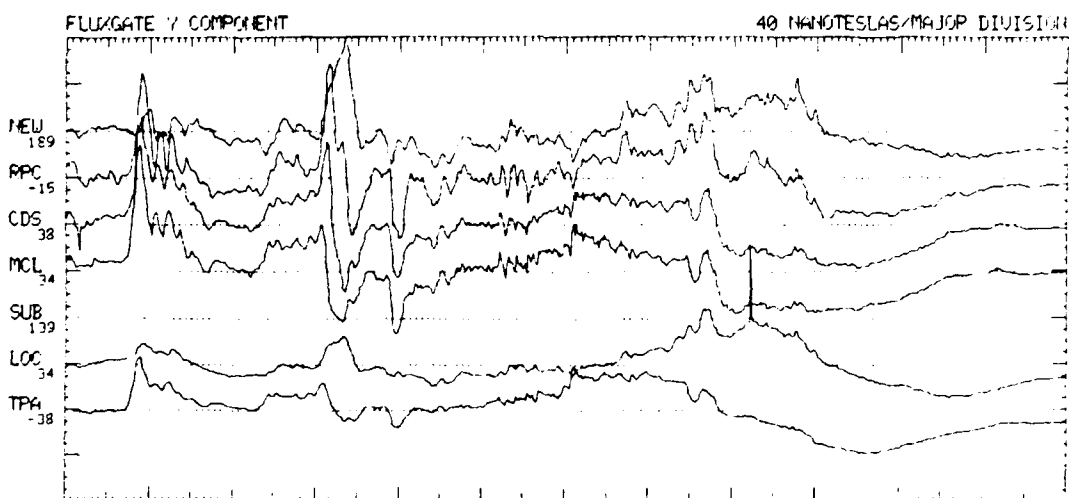
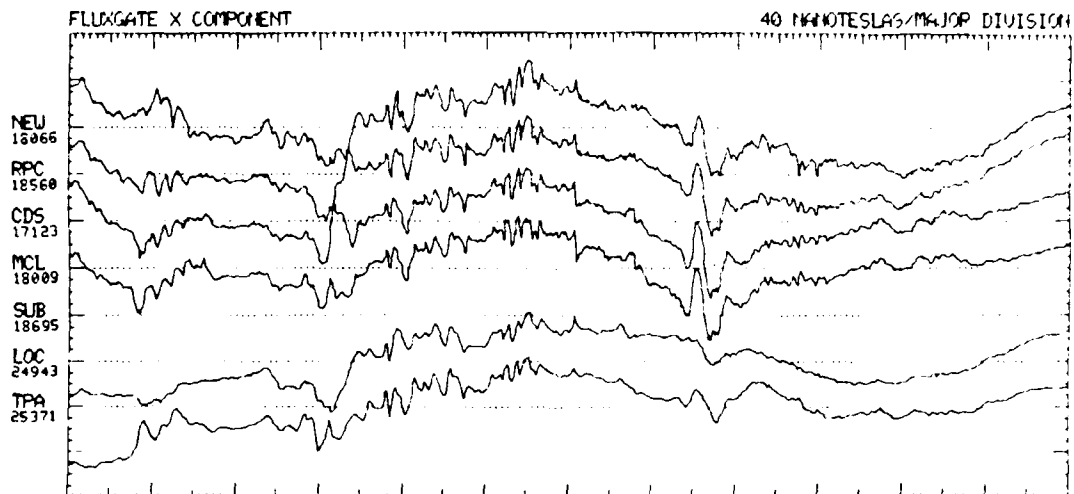


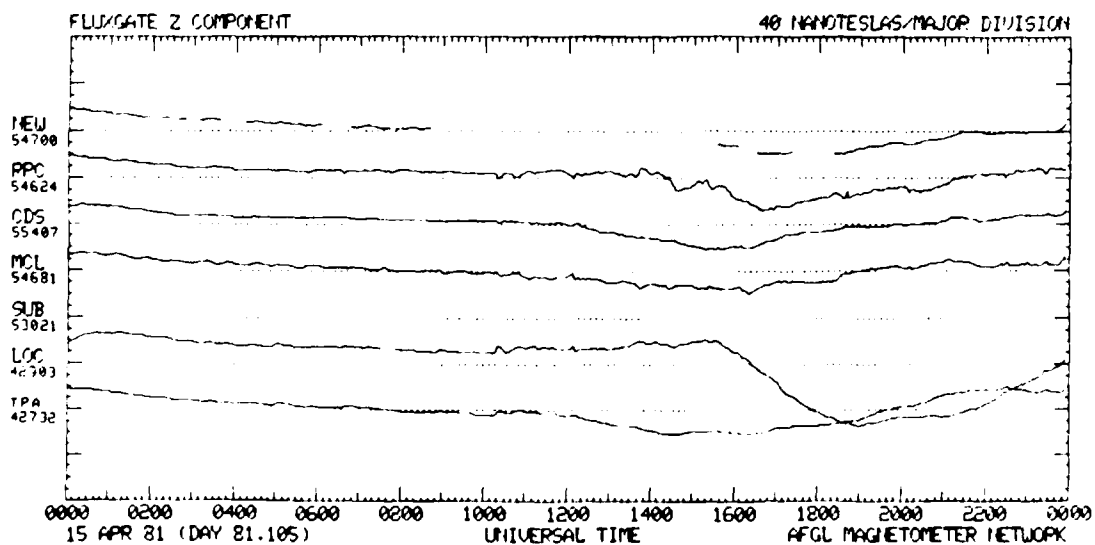
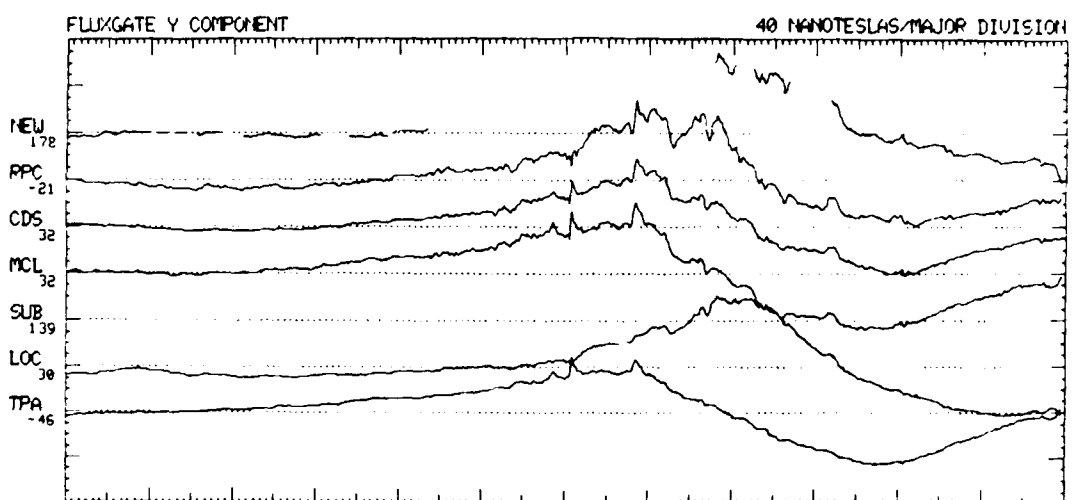
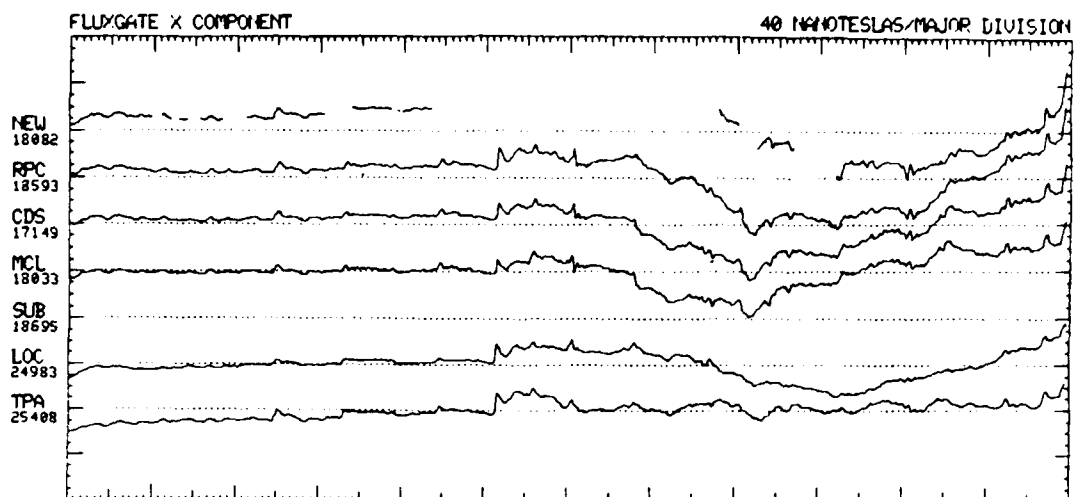


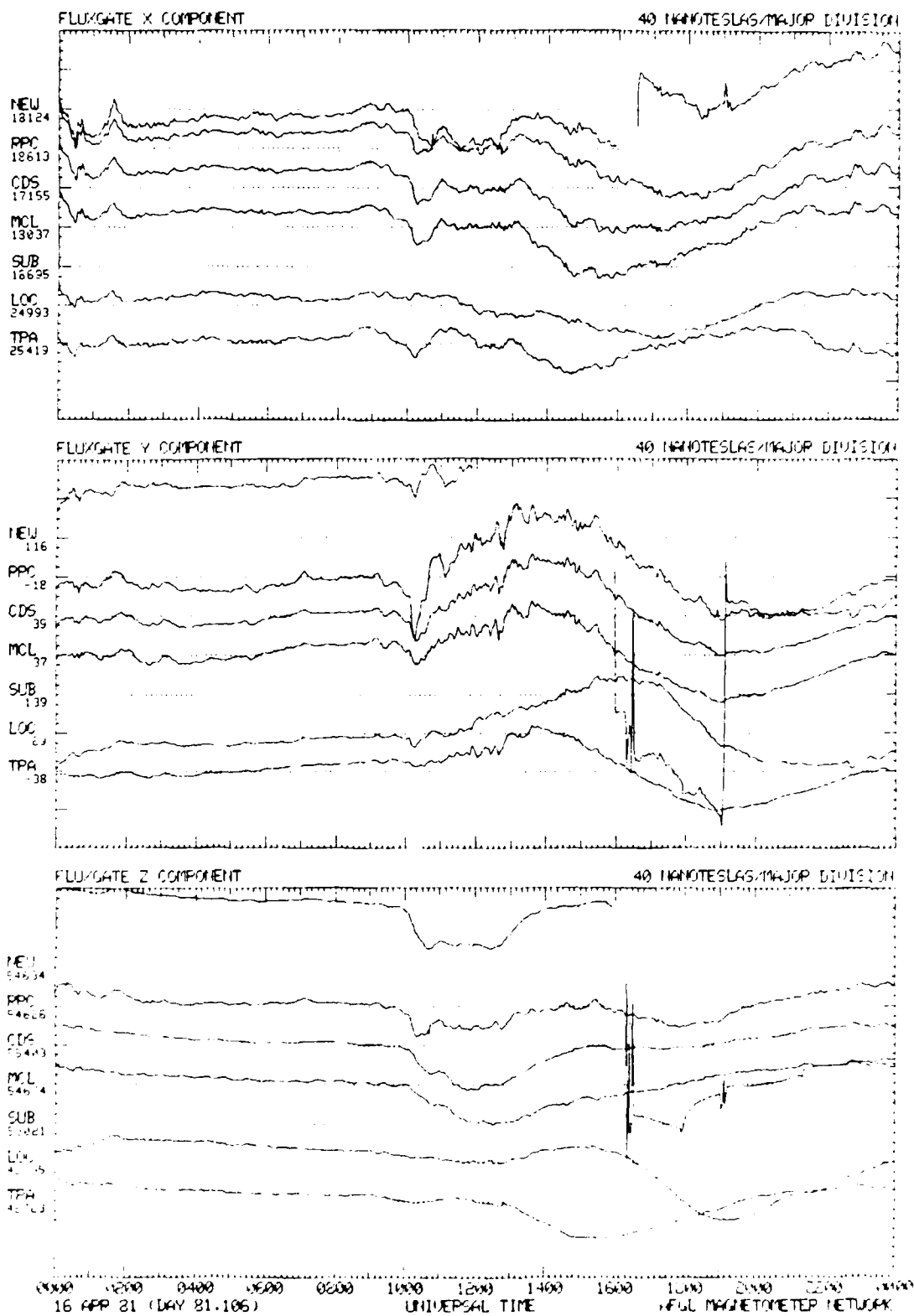


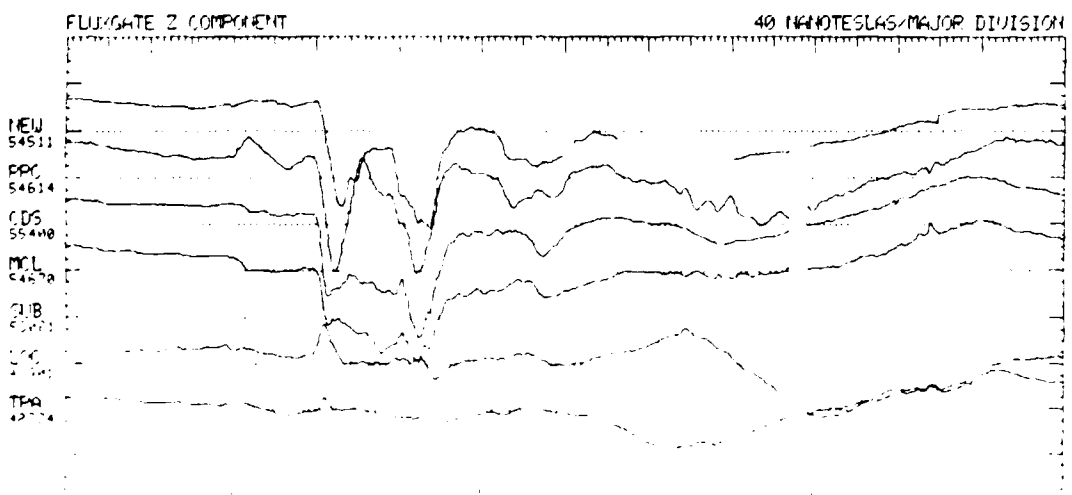
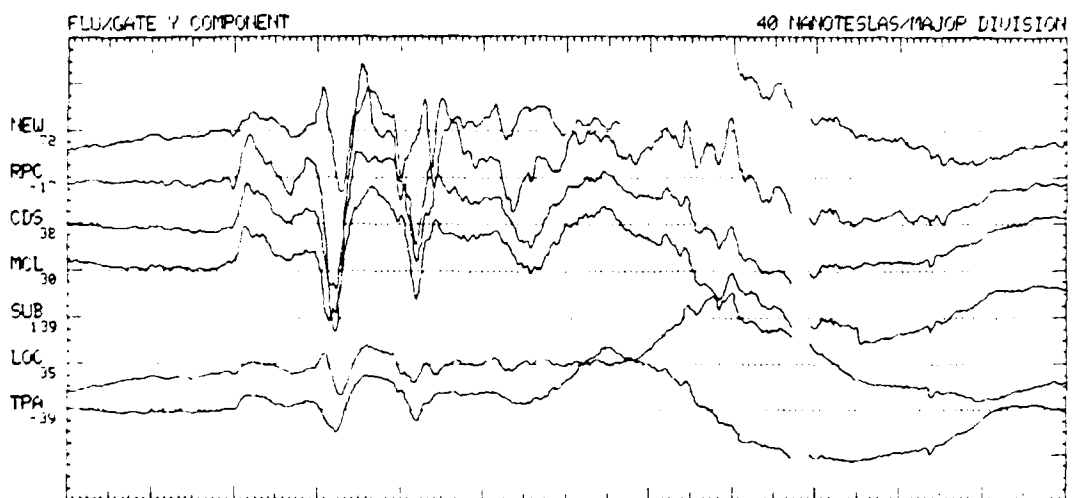
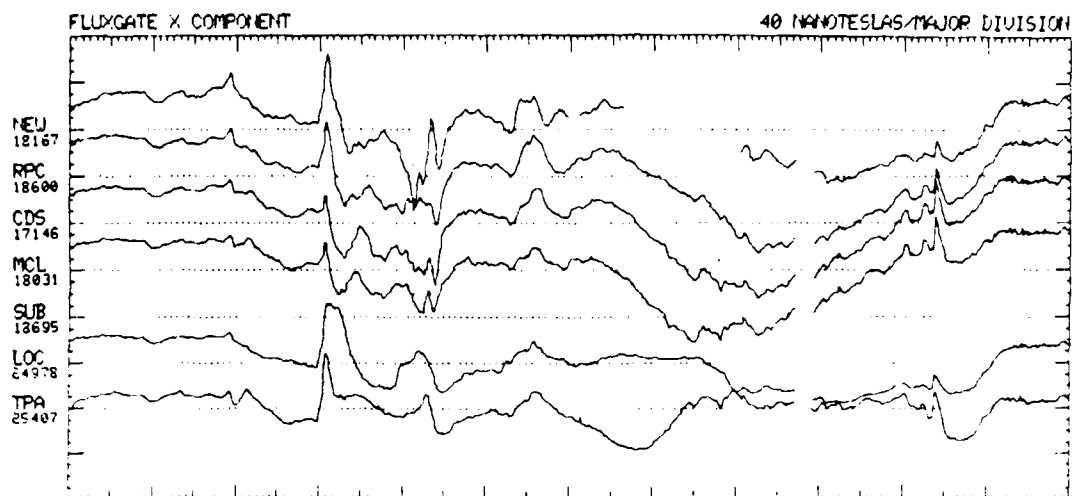




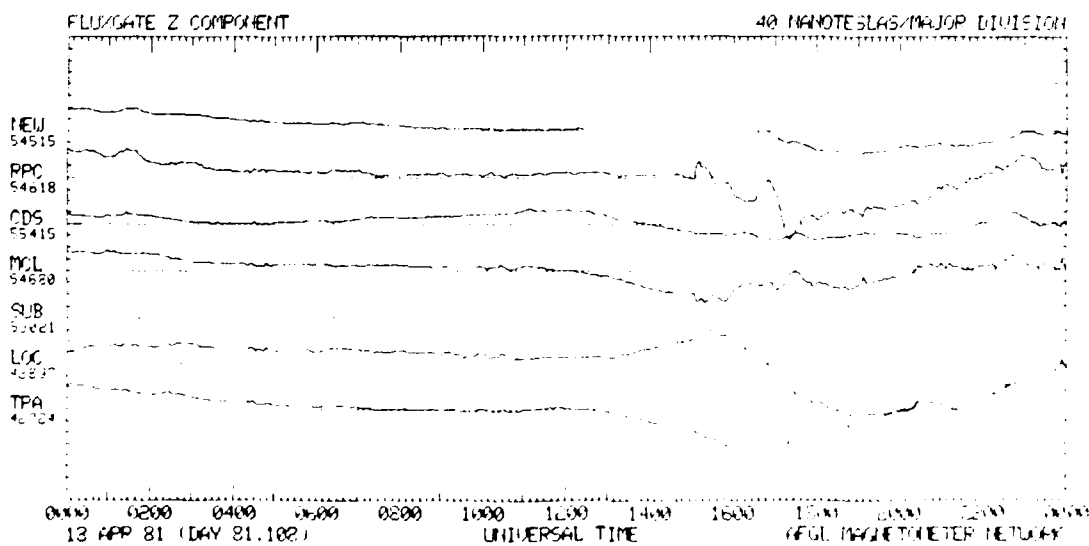
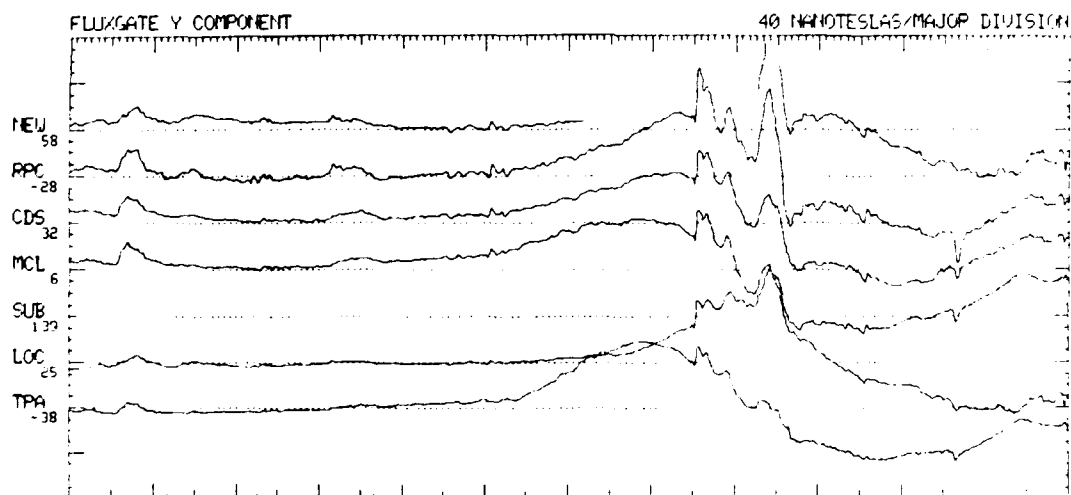
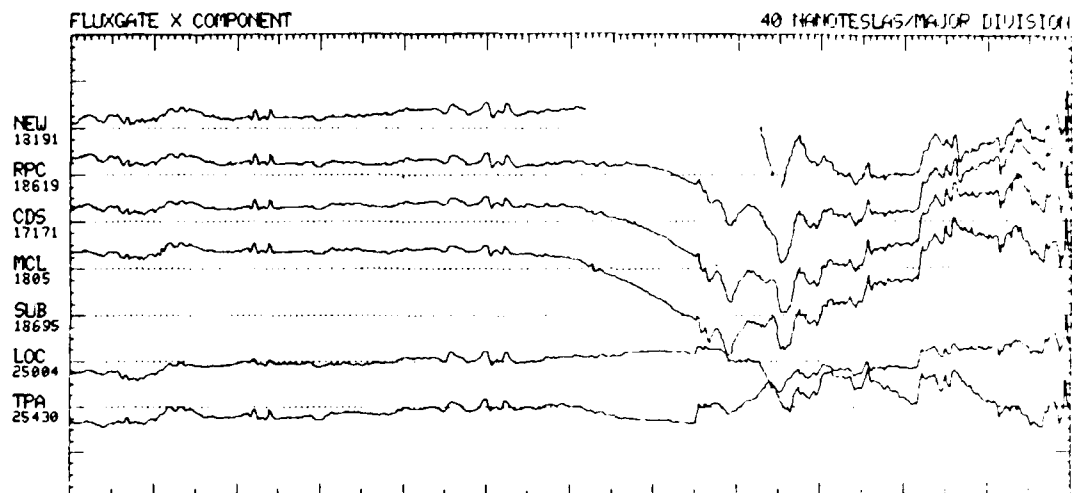




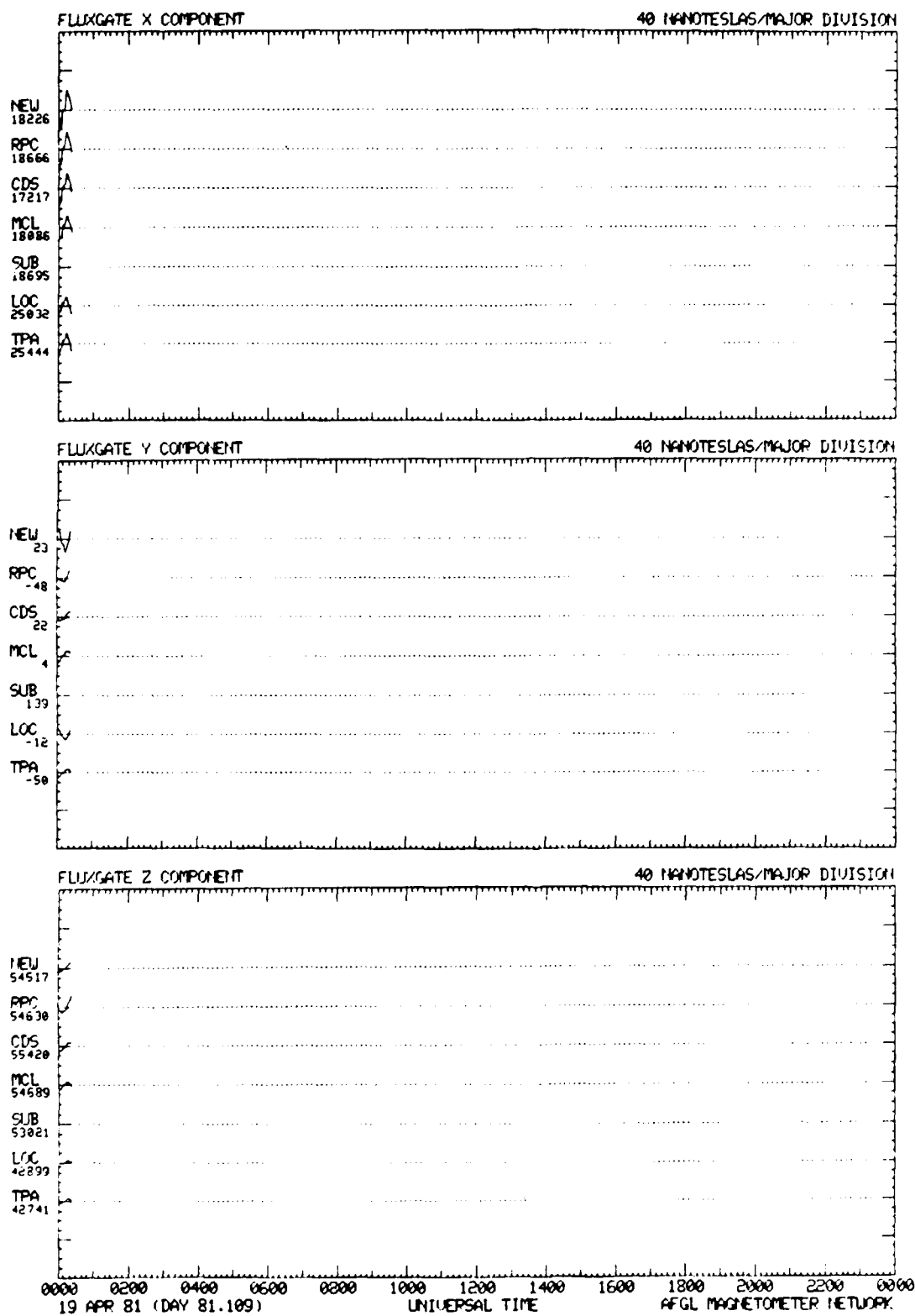


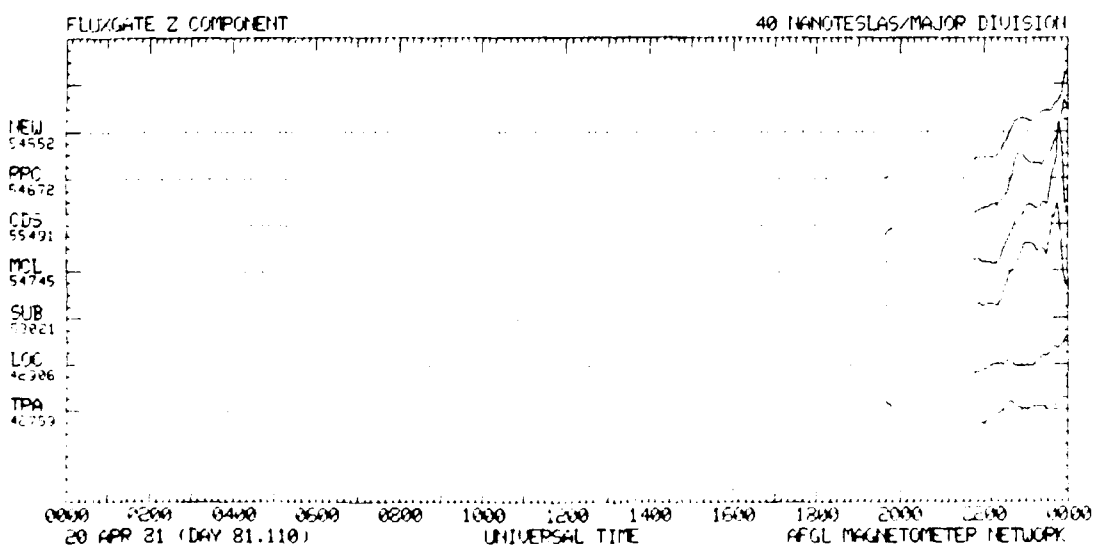
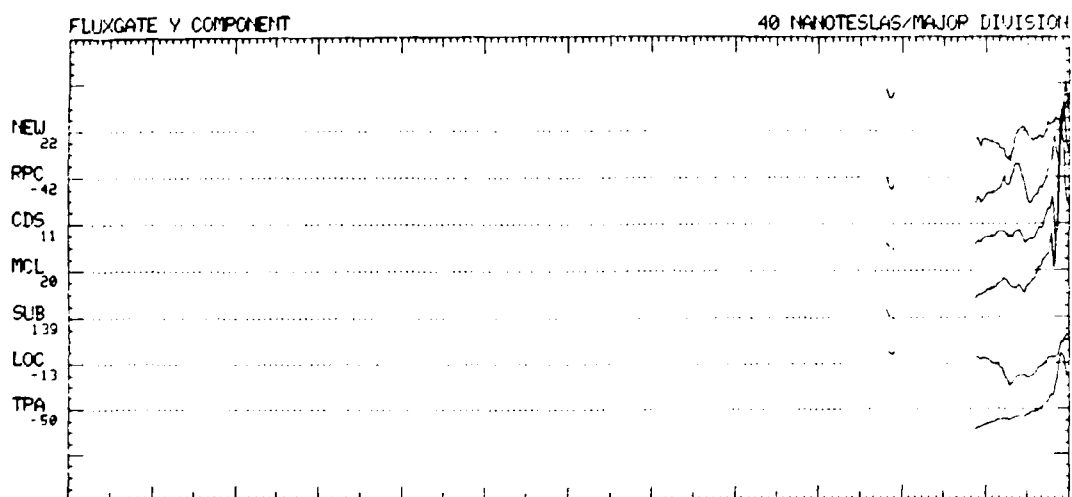
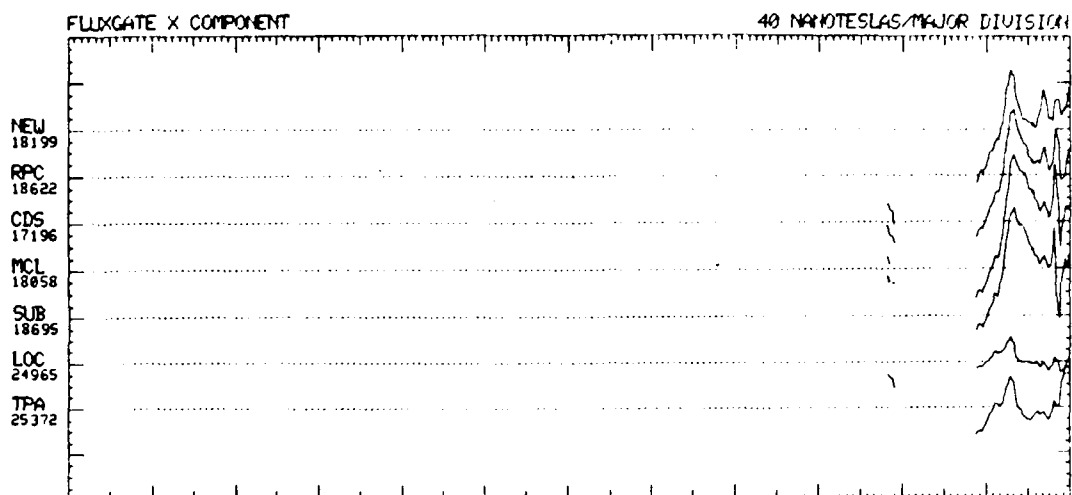


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17 APR 81 (DAY 81.107) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

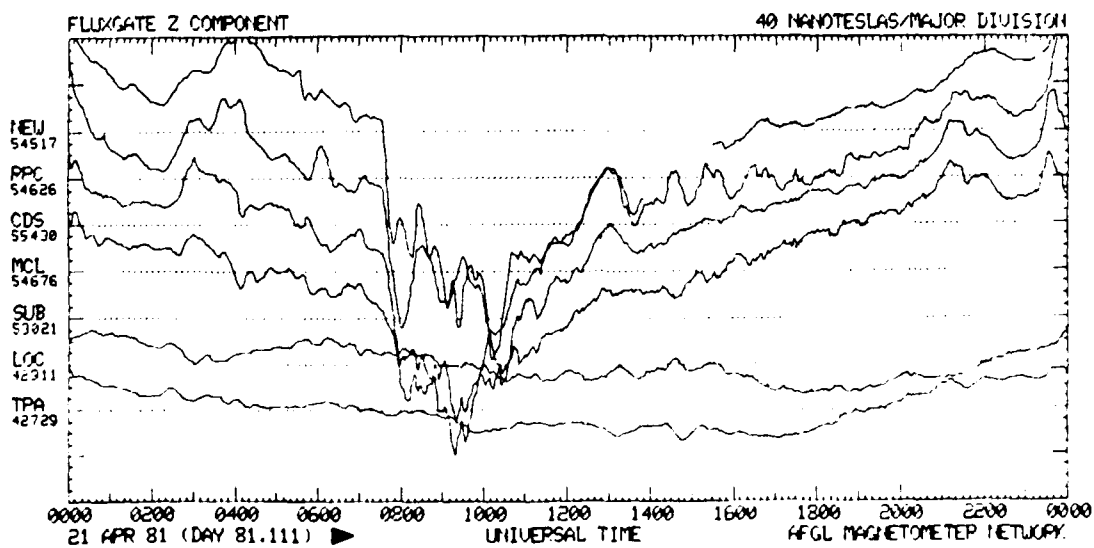
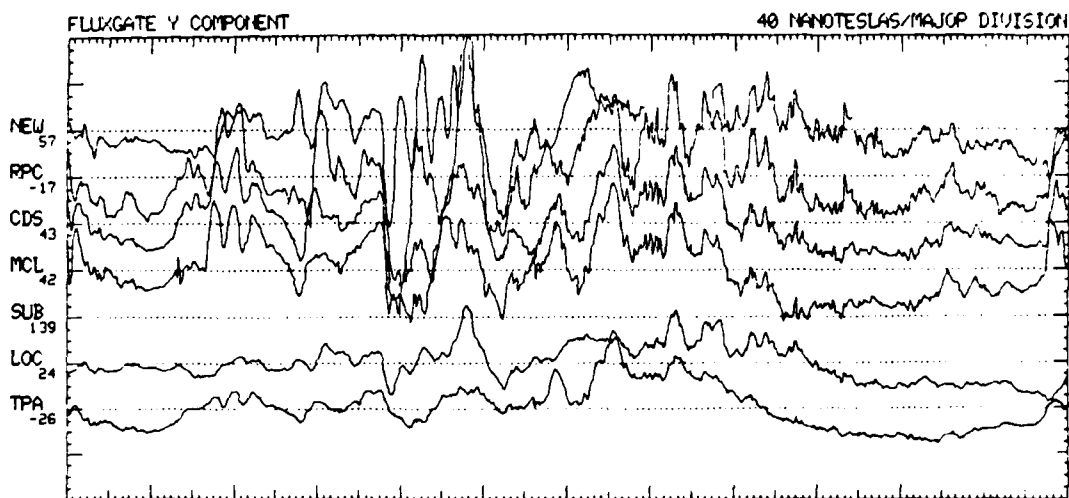
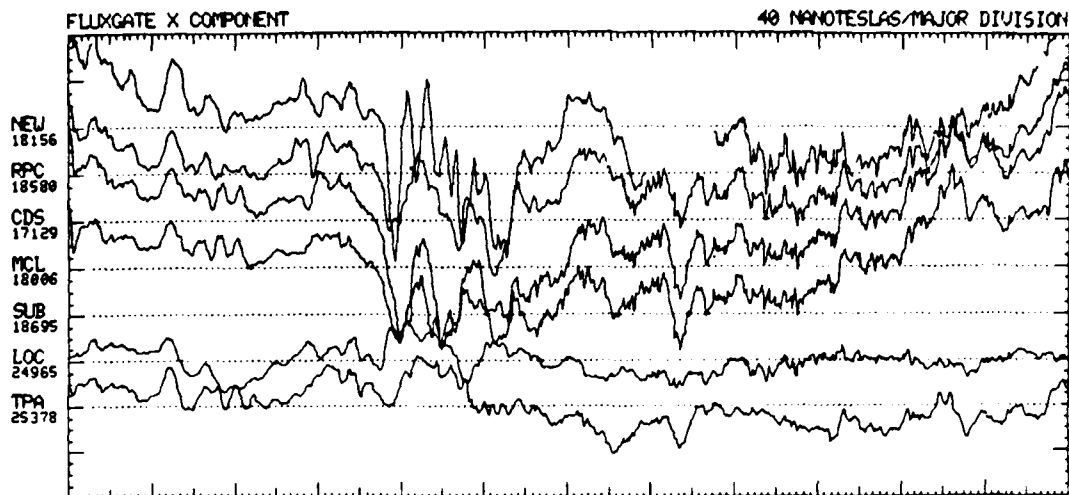


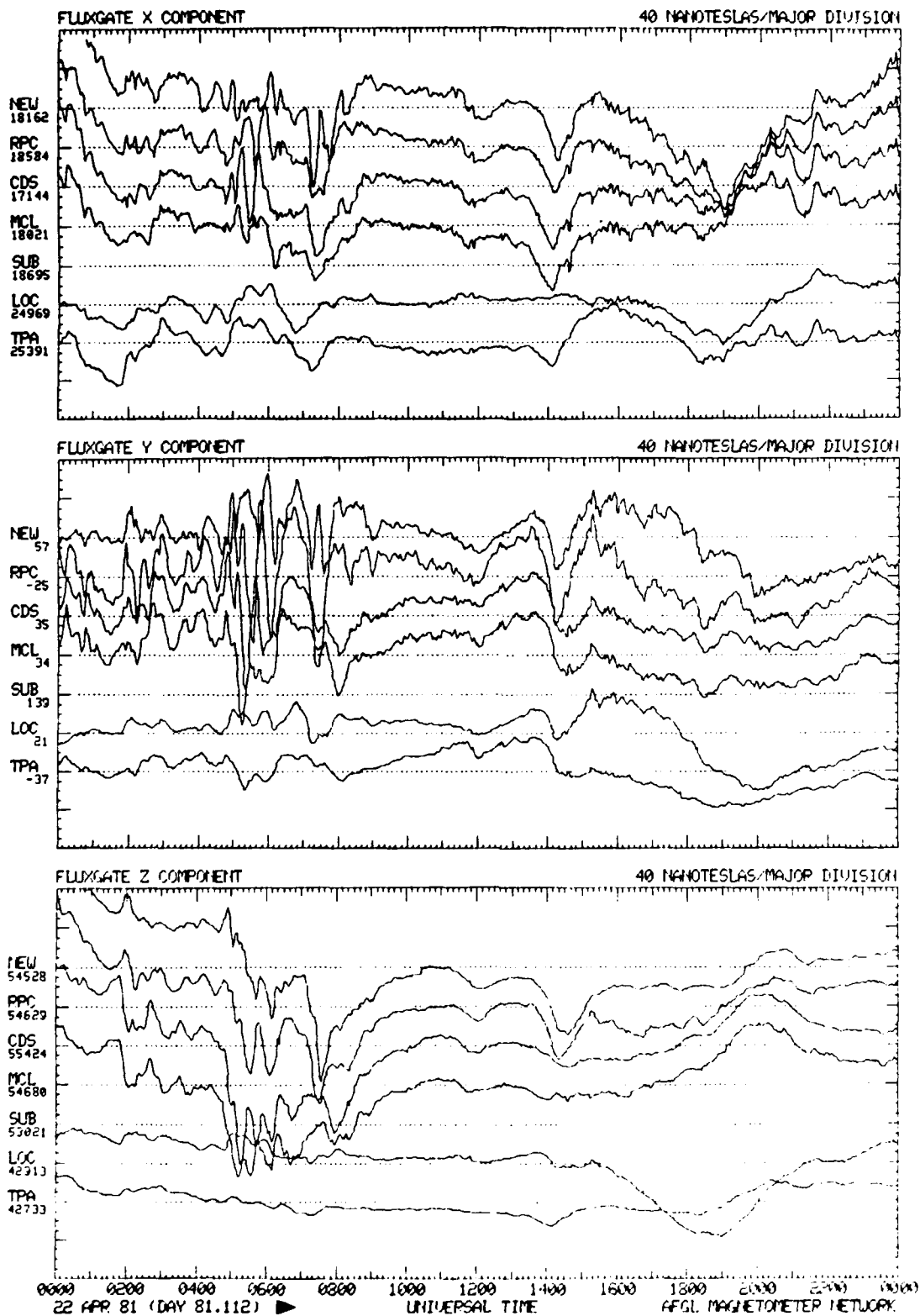


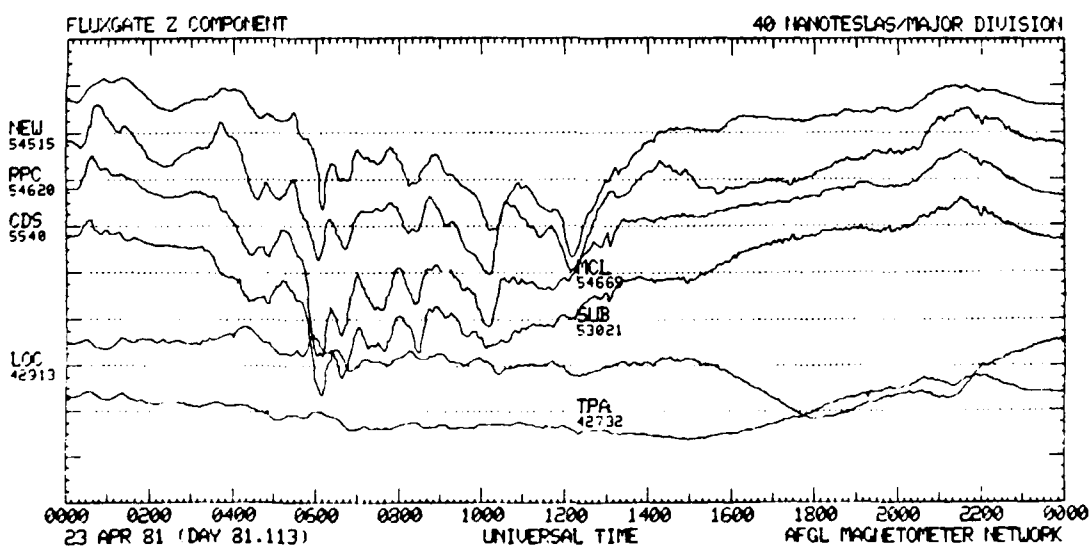
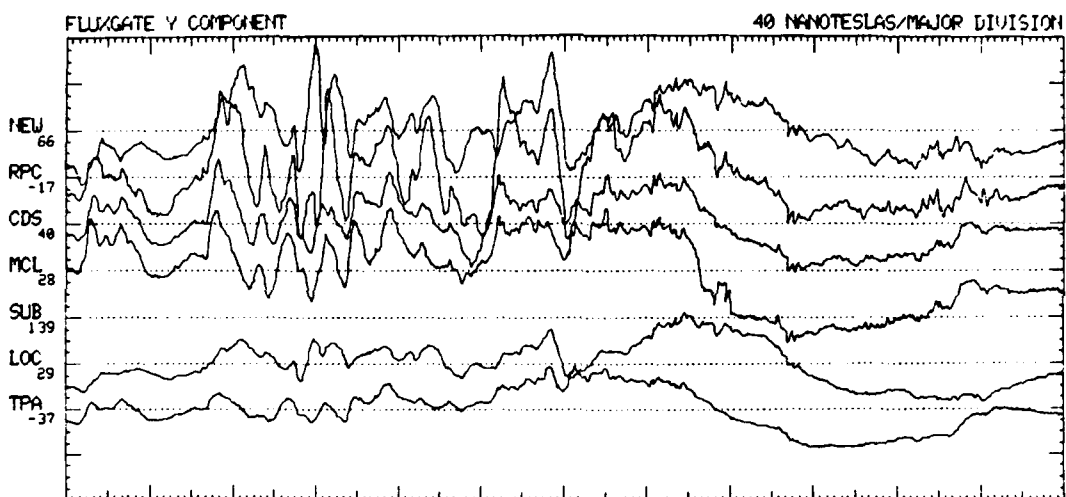
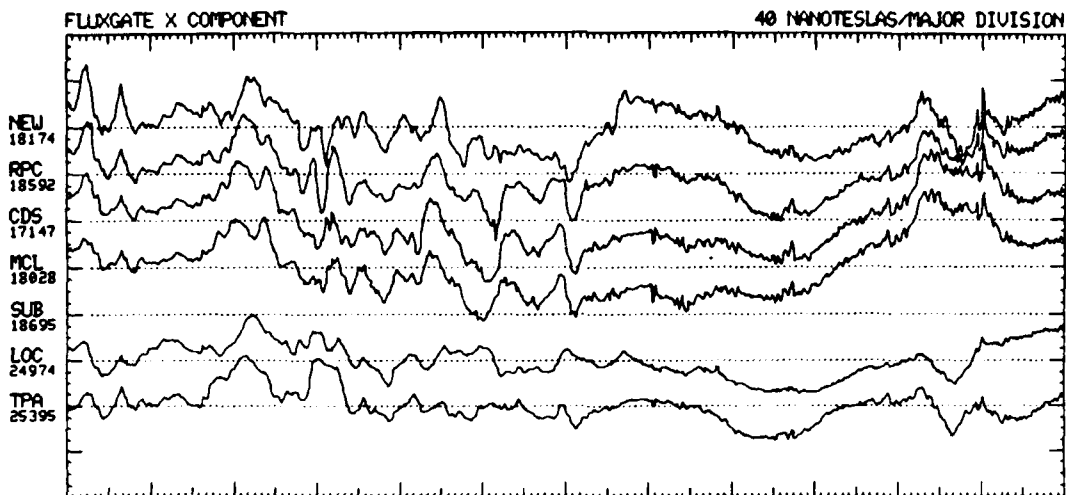


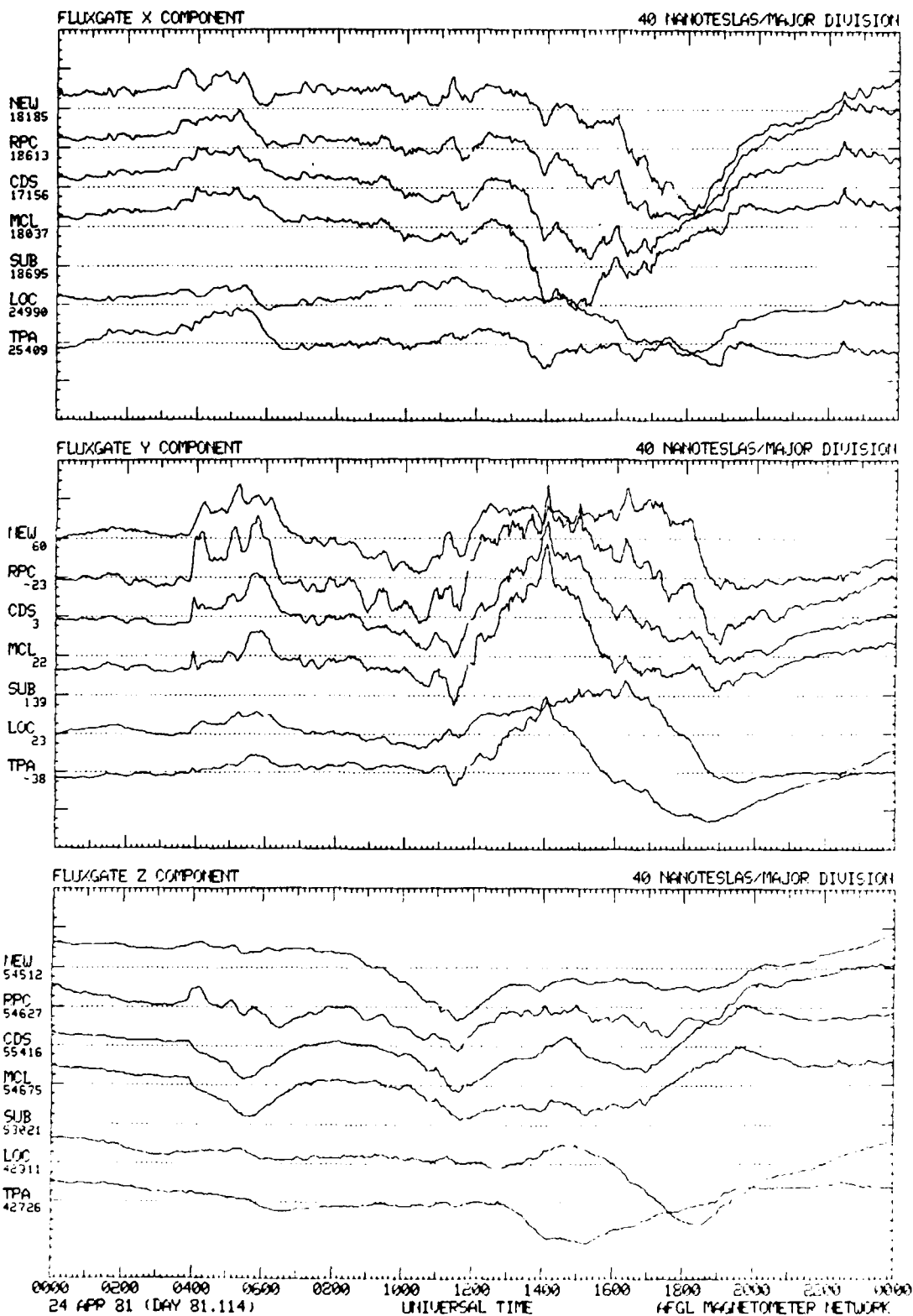


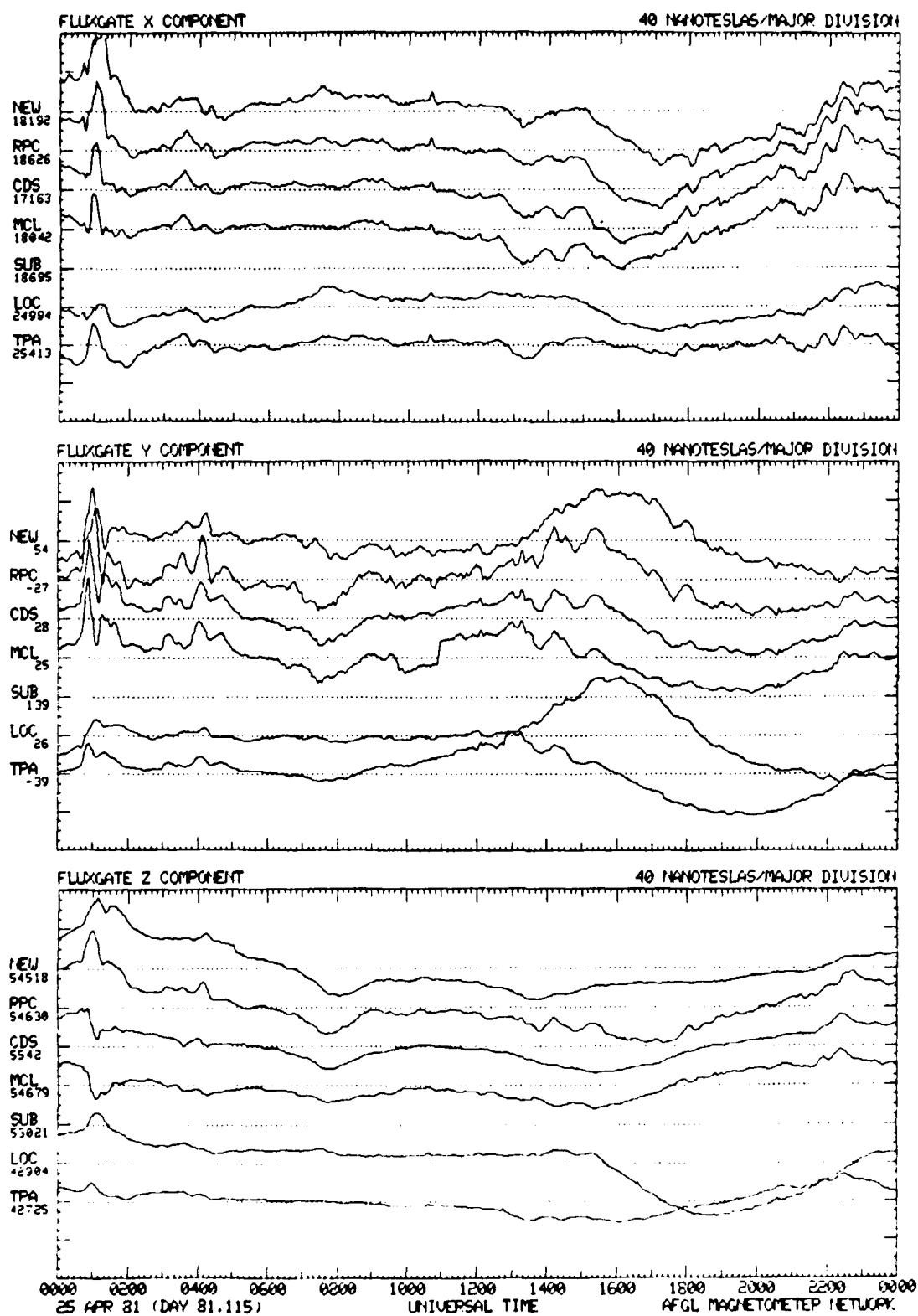
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20 APR 81 (DAY 81.110) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

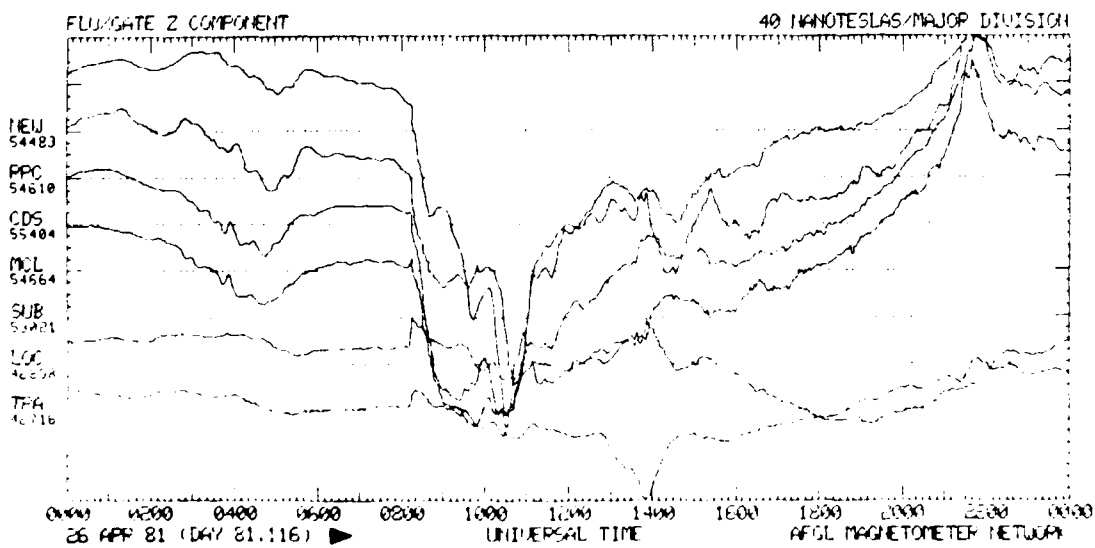
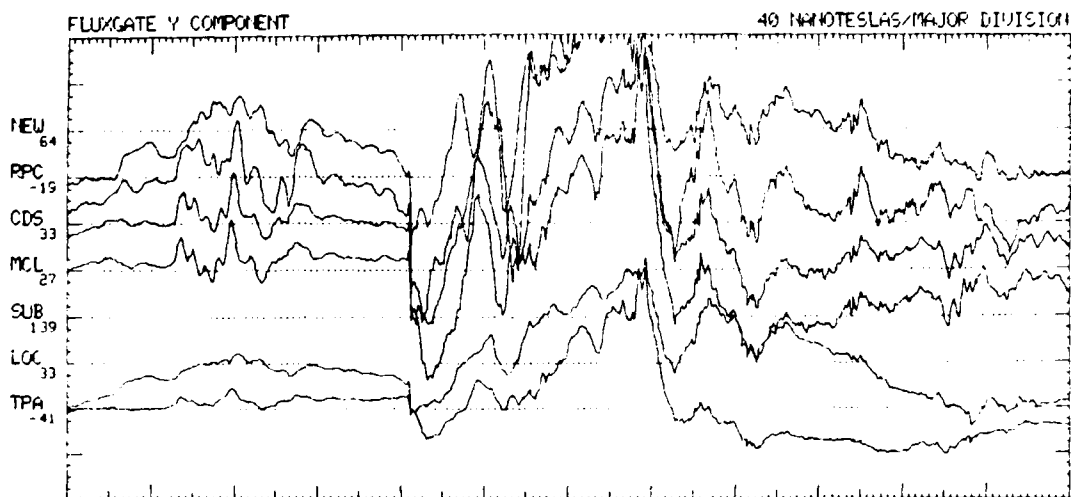
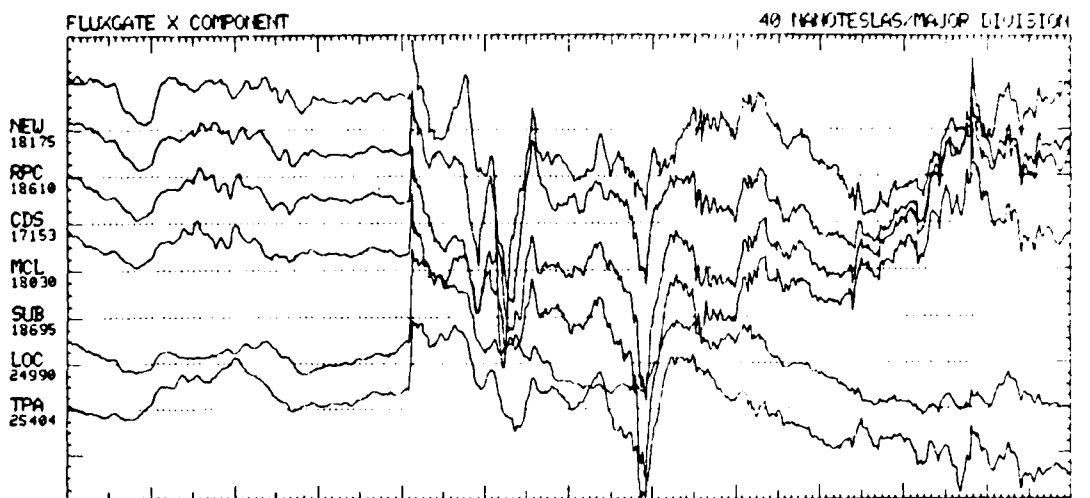




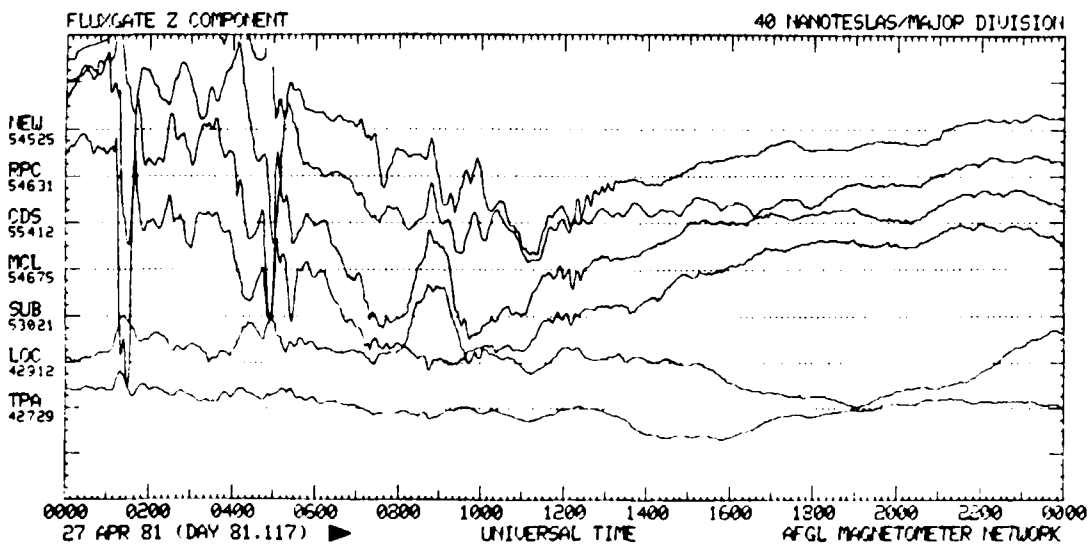
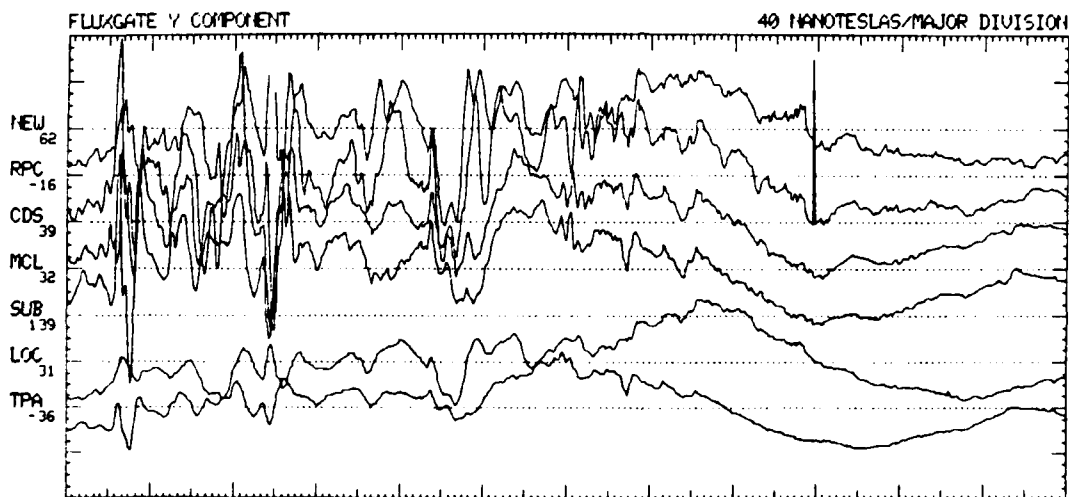
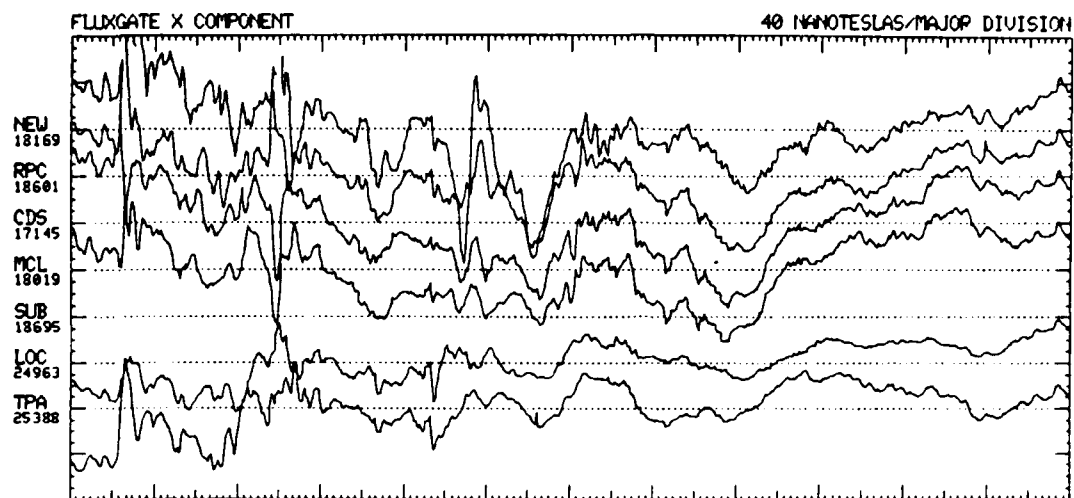


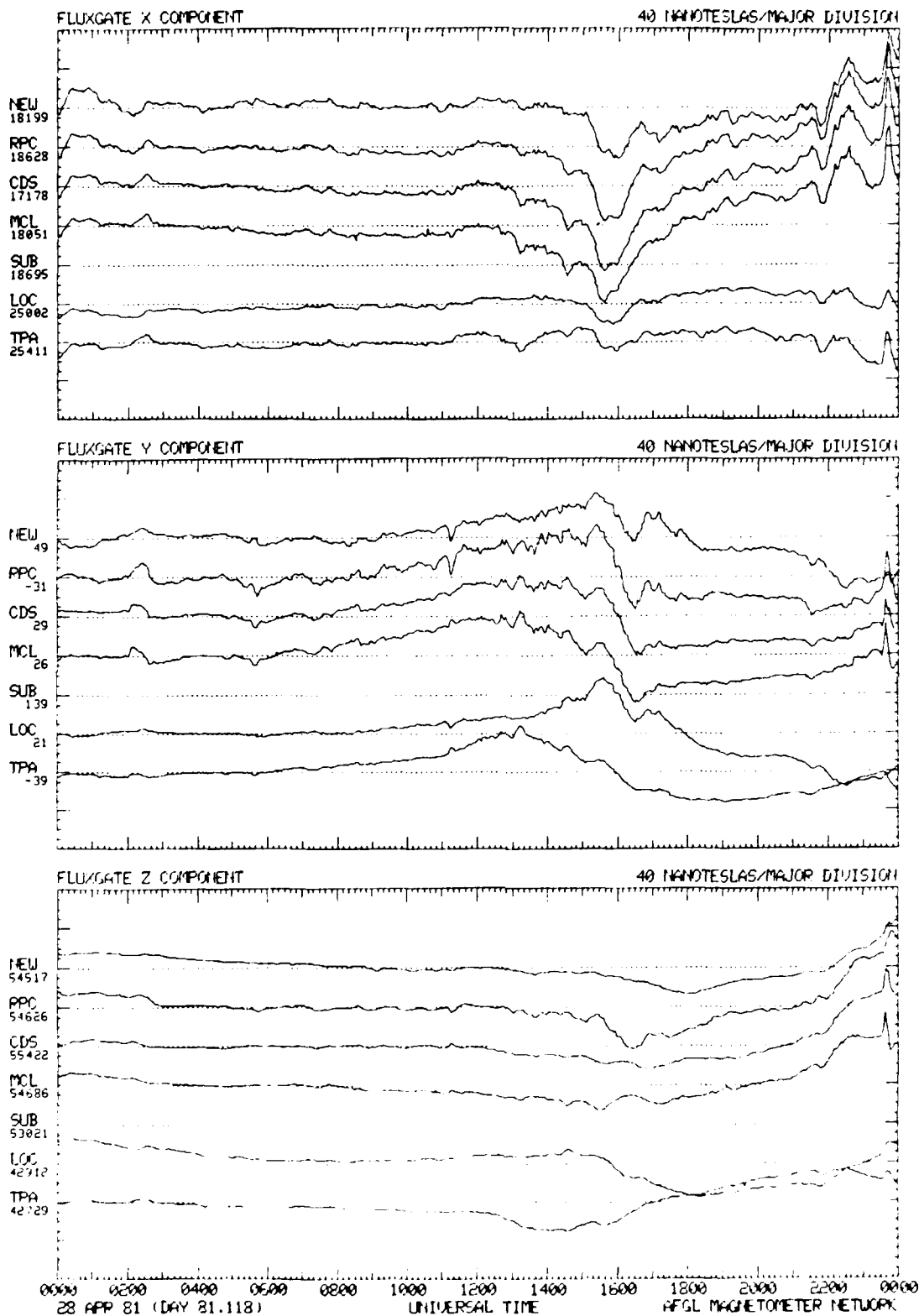


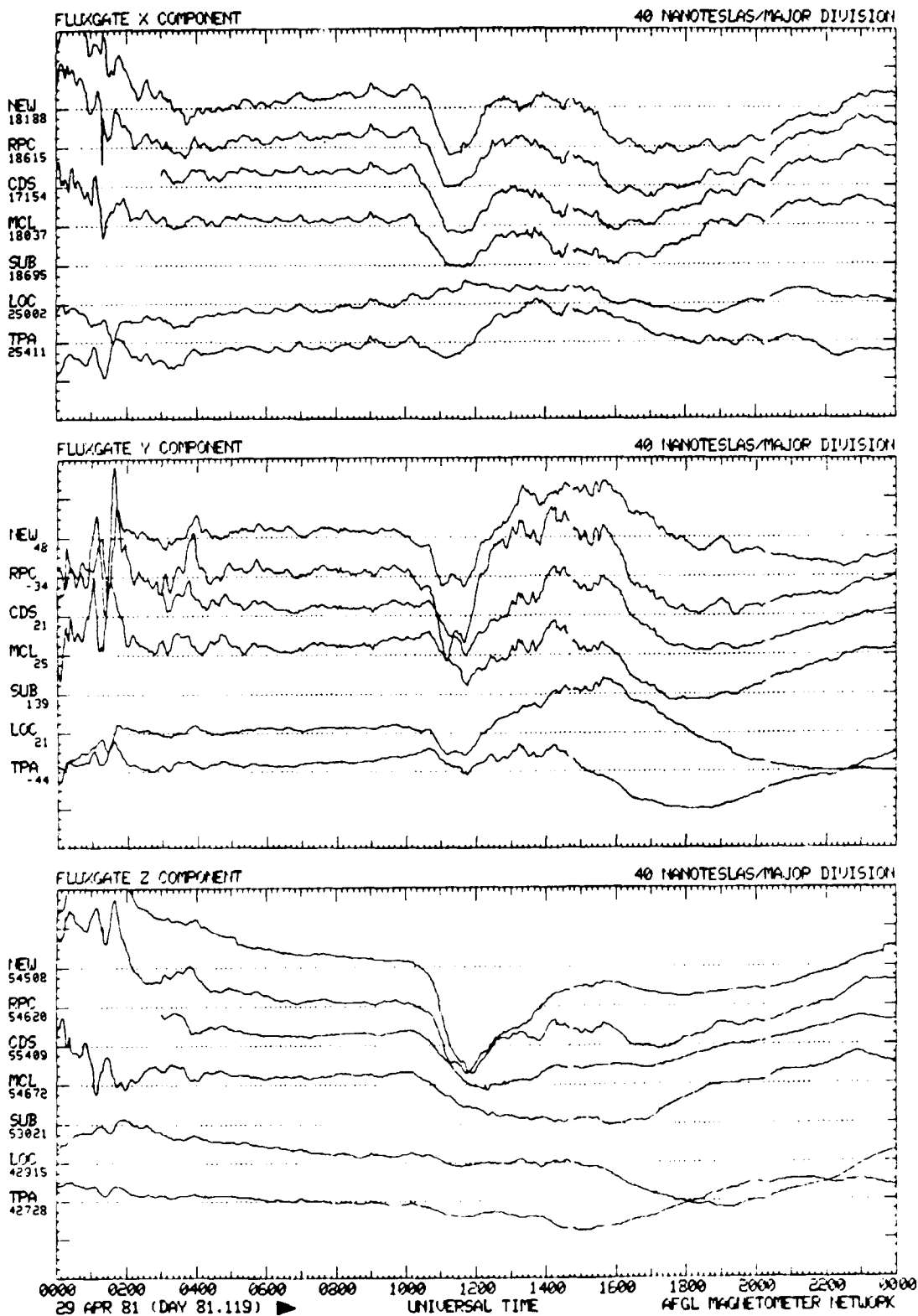


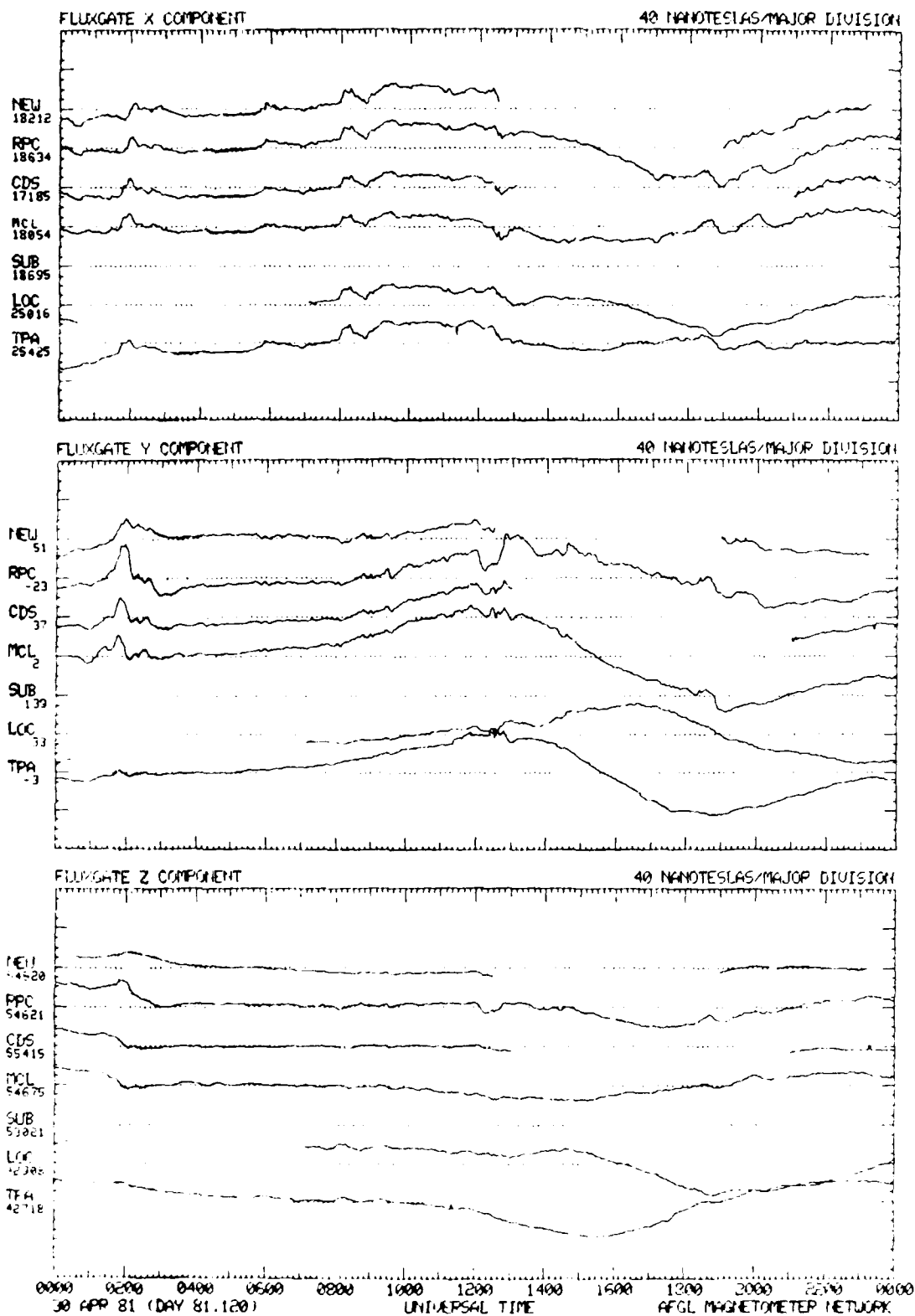


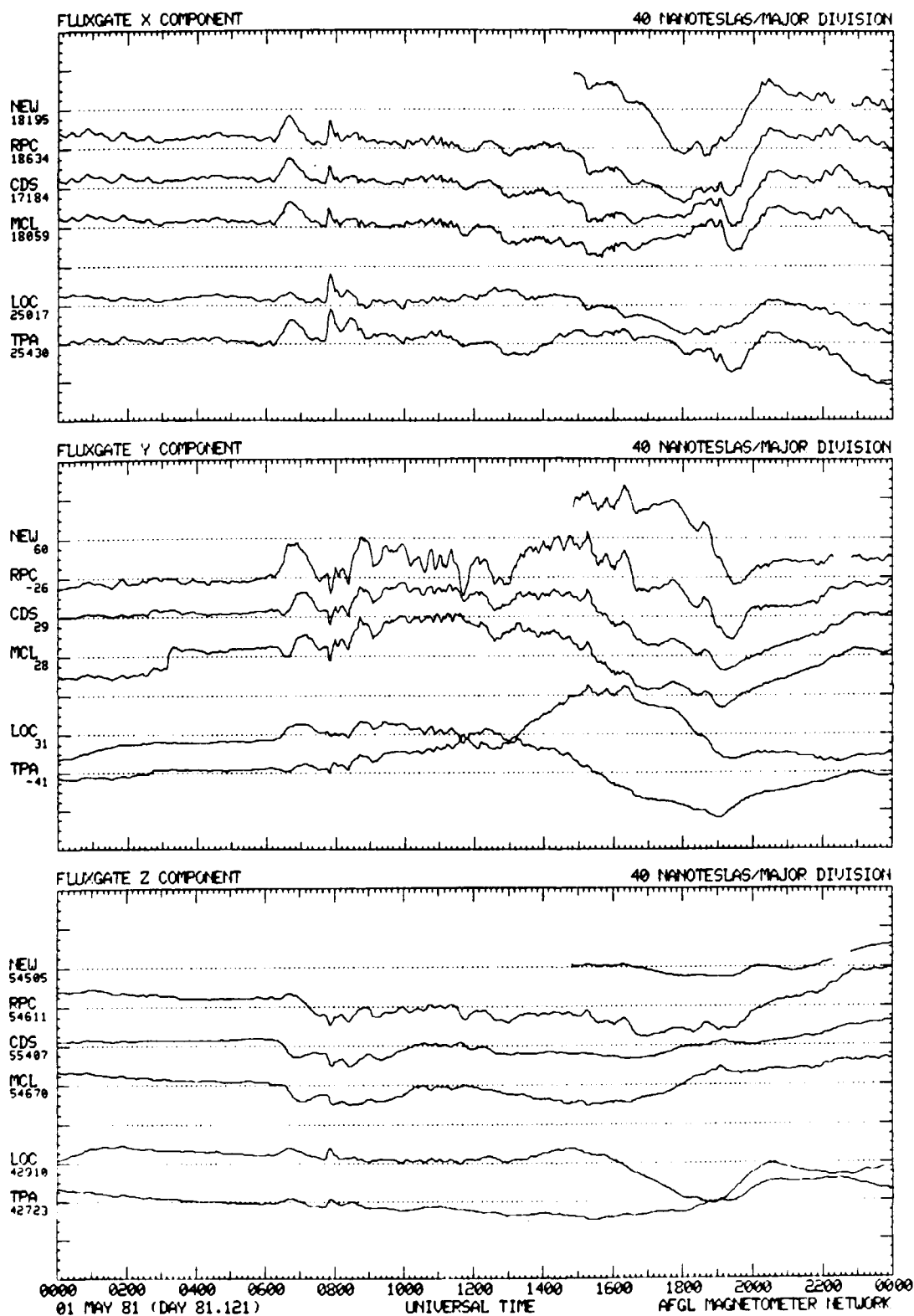


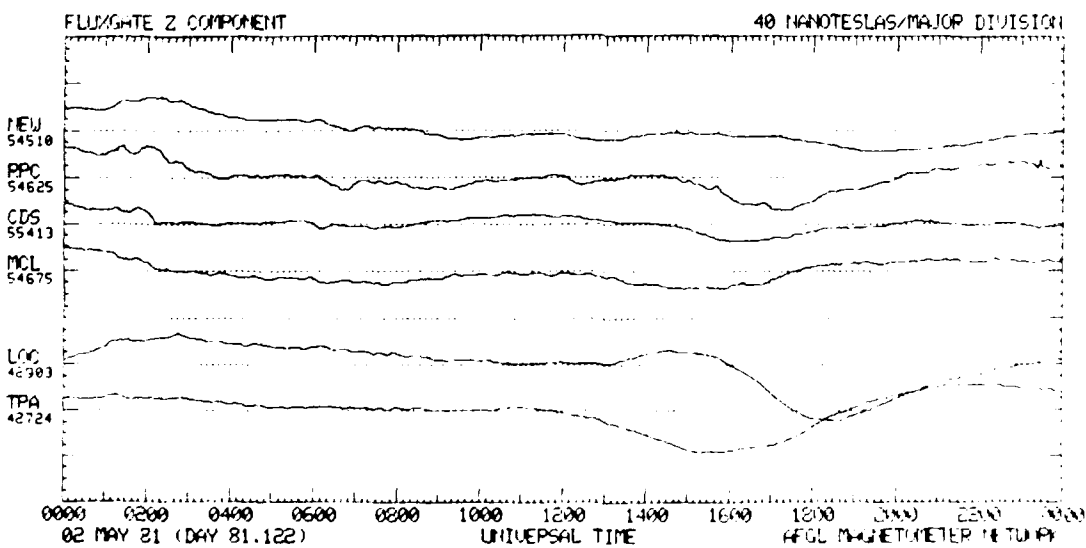
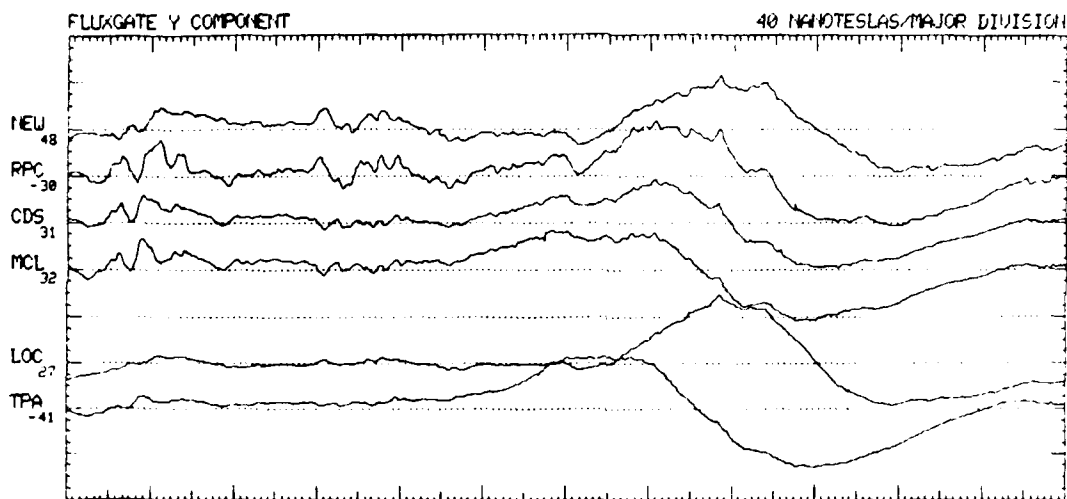
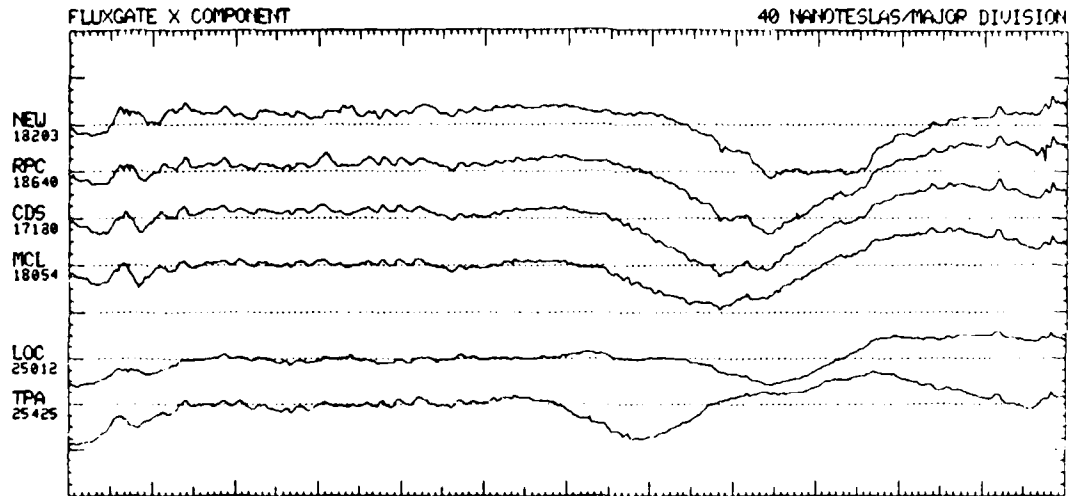


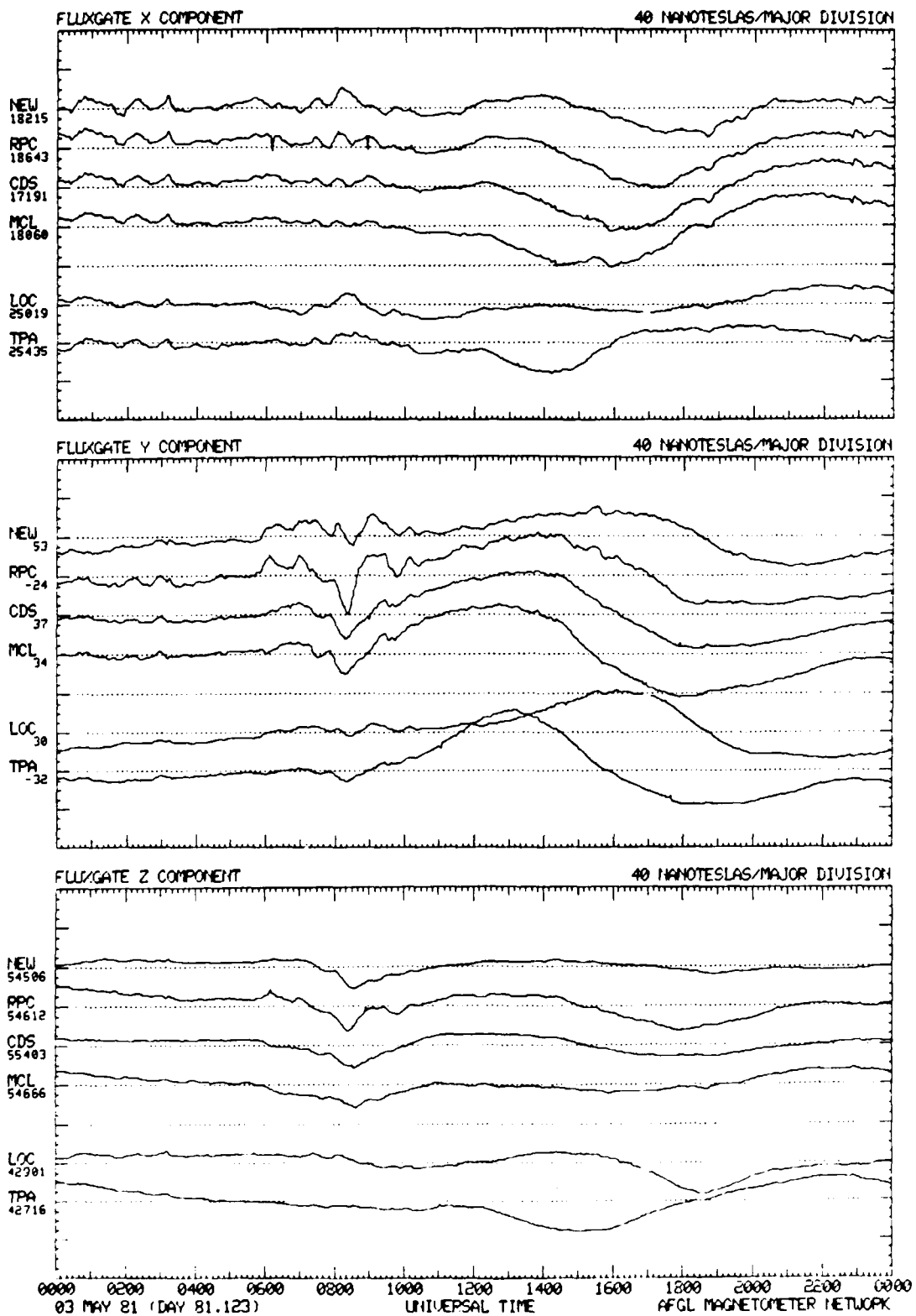


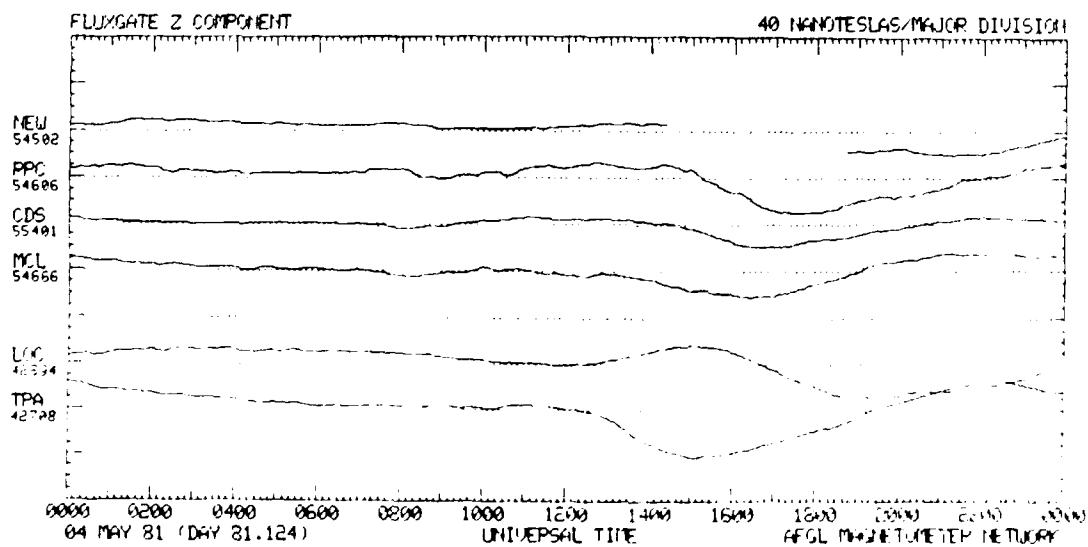
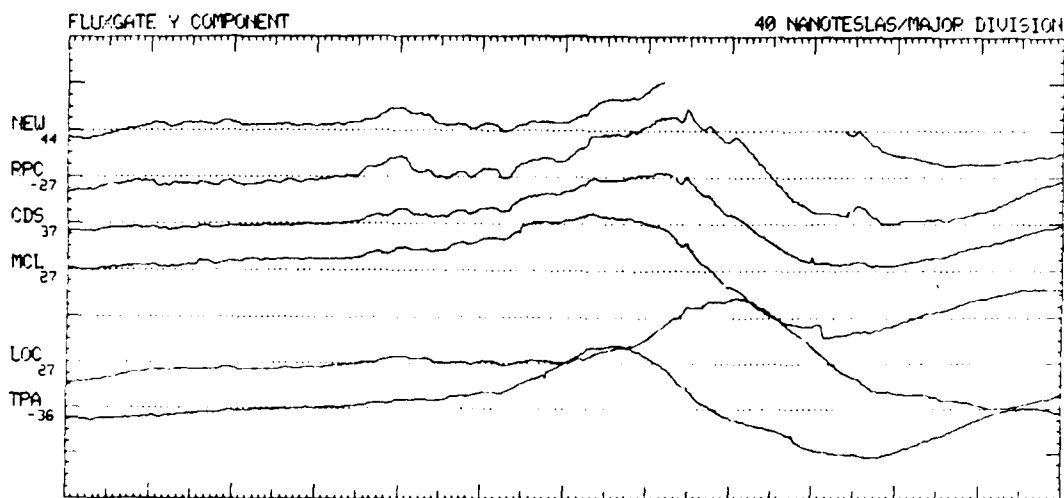
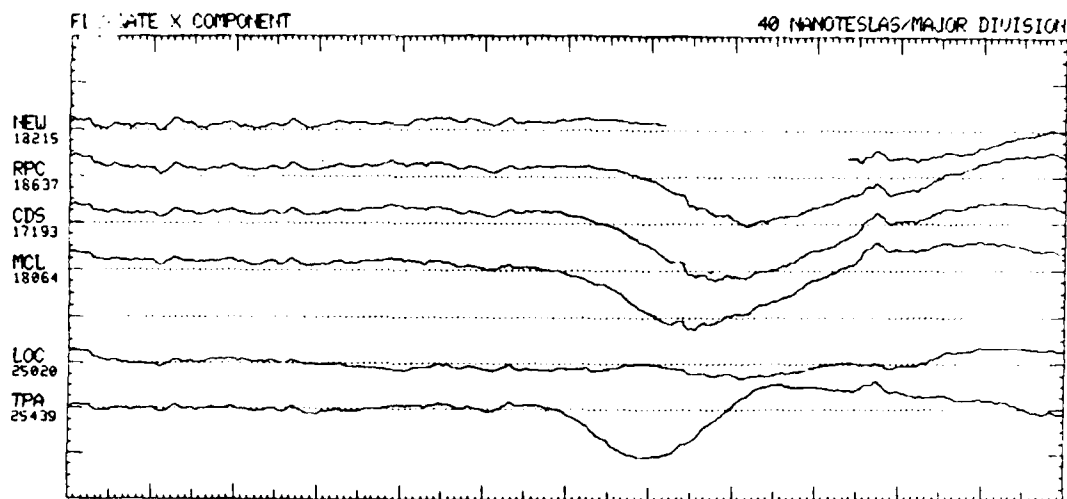




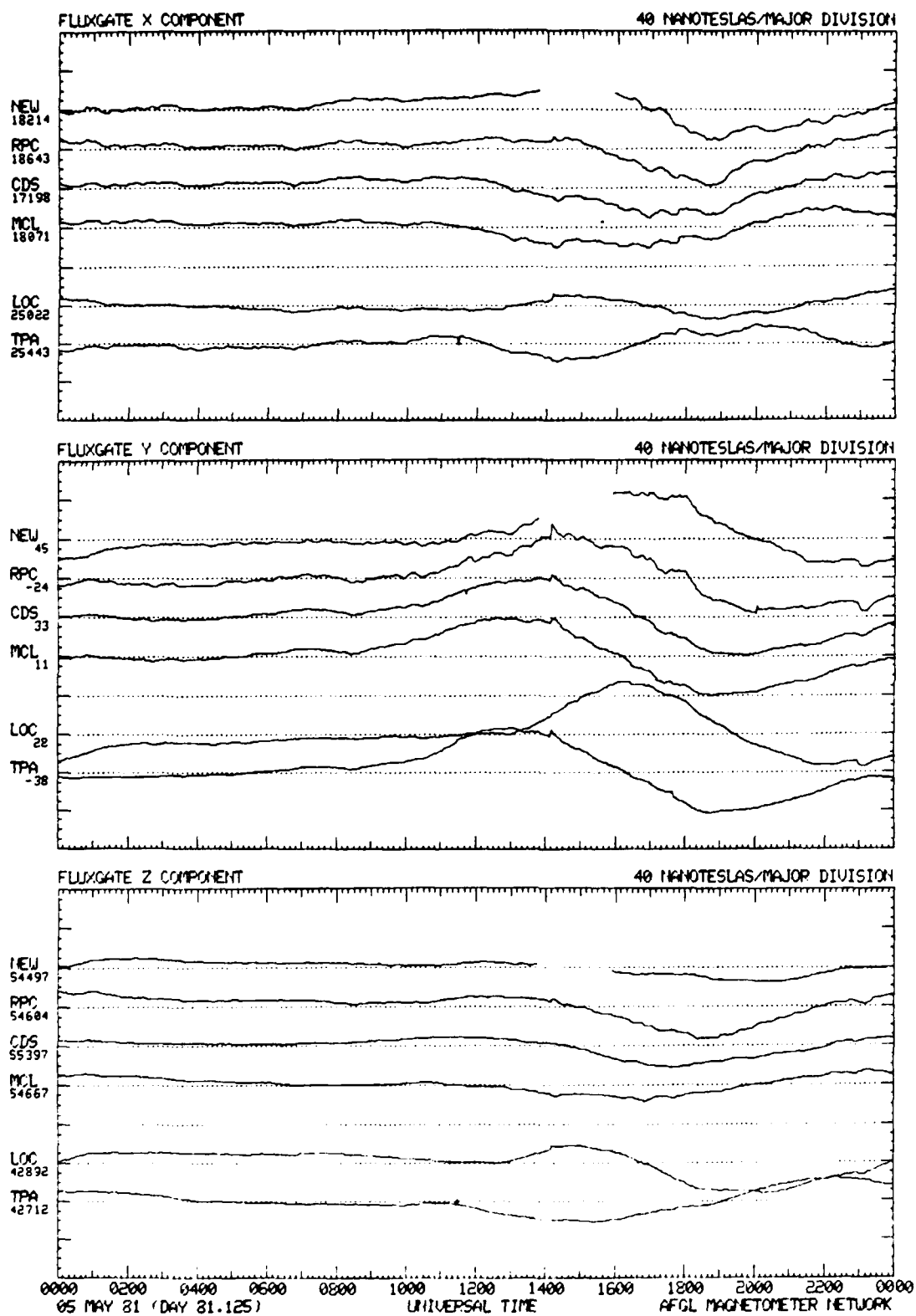


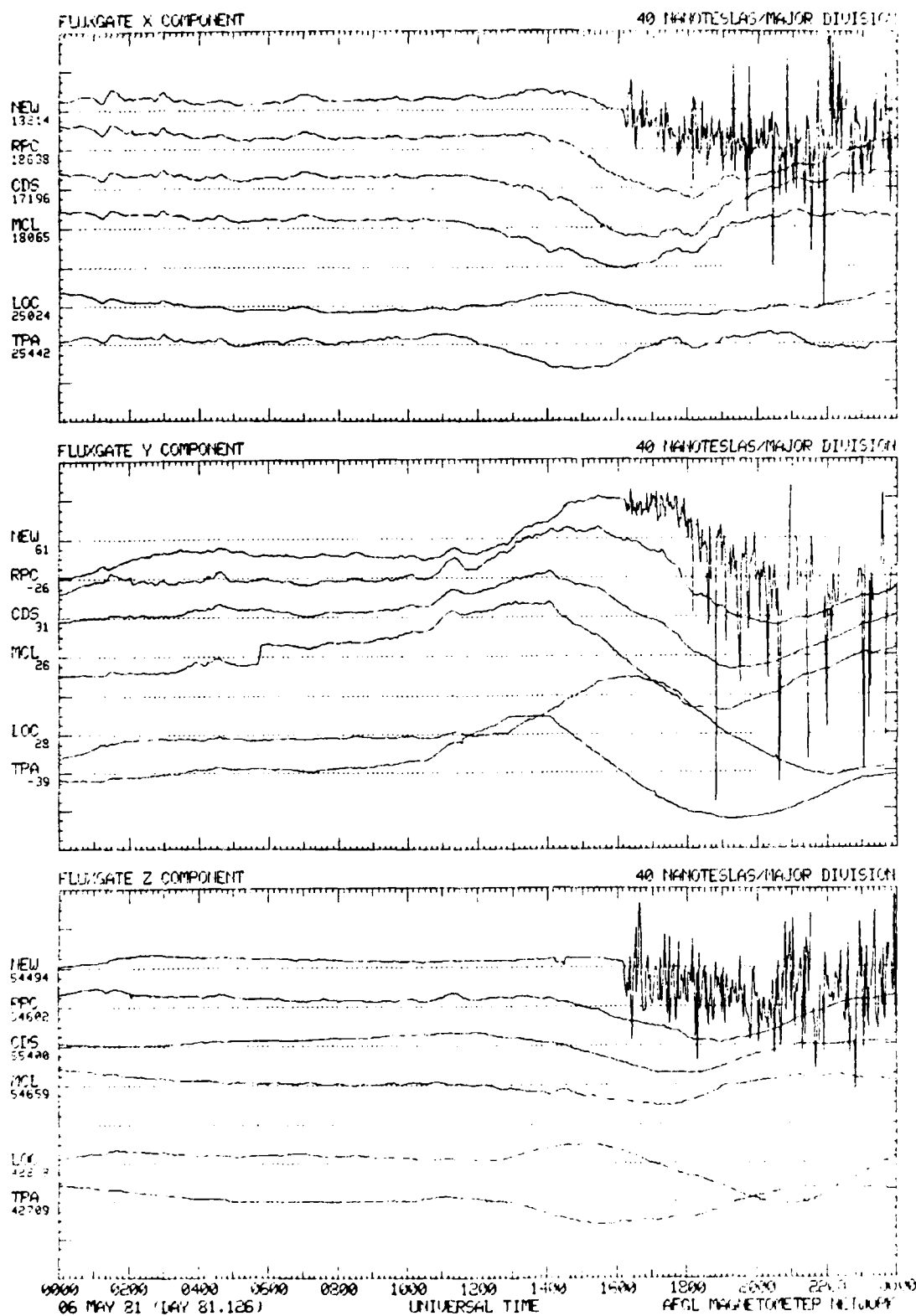


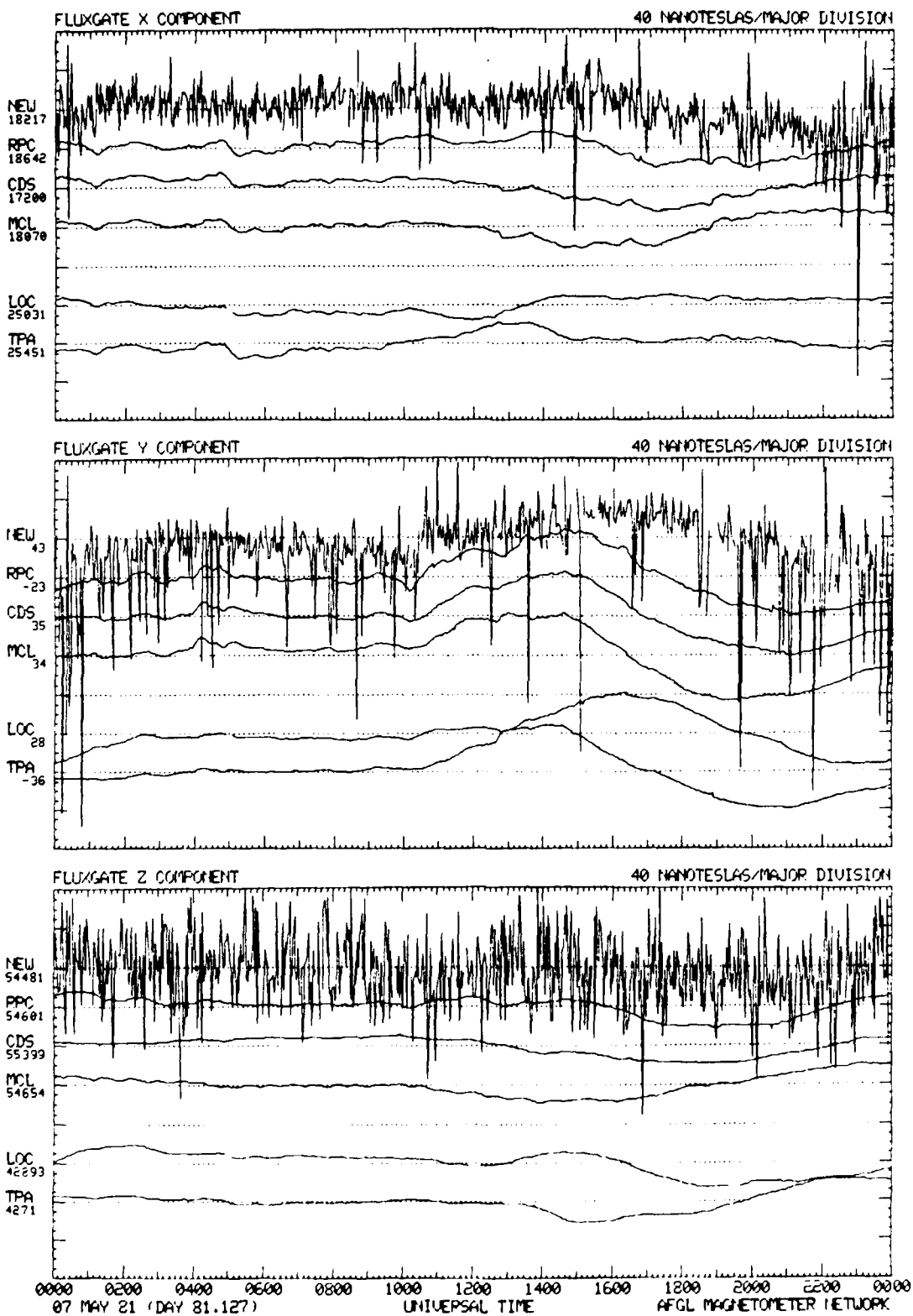


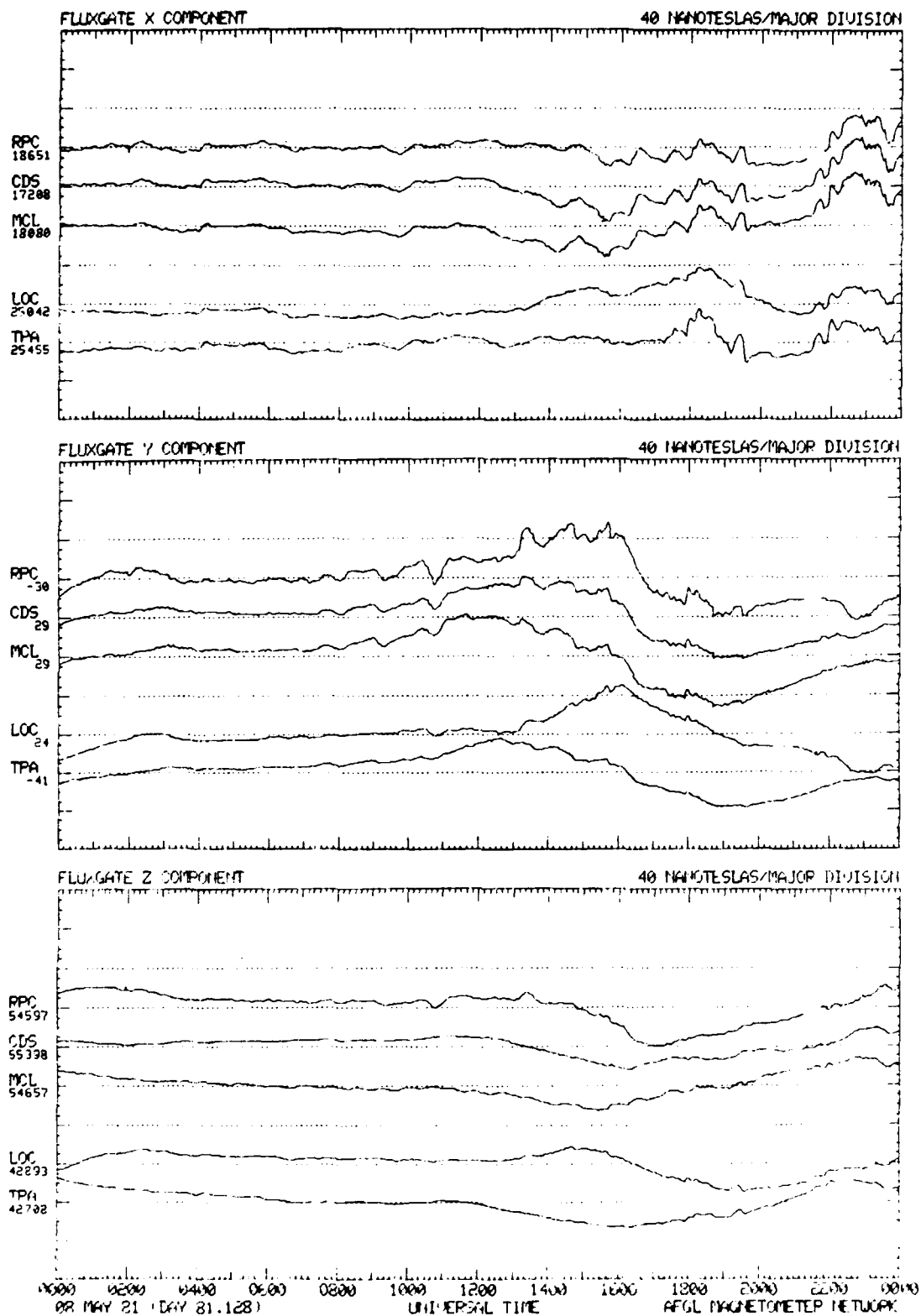


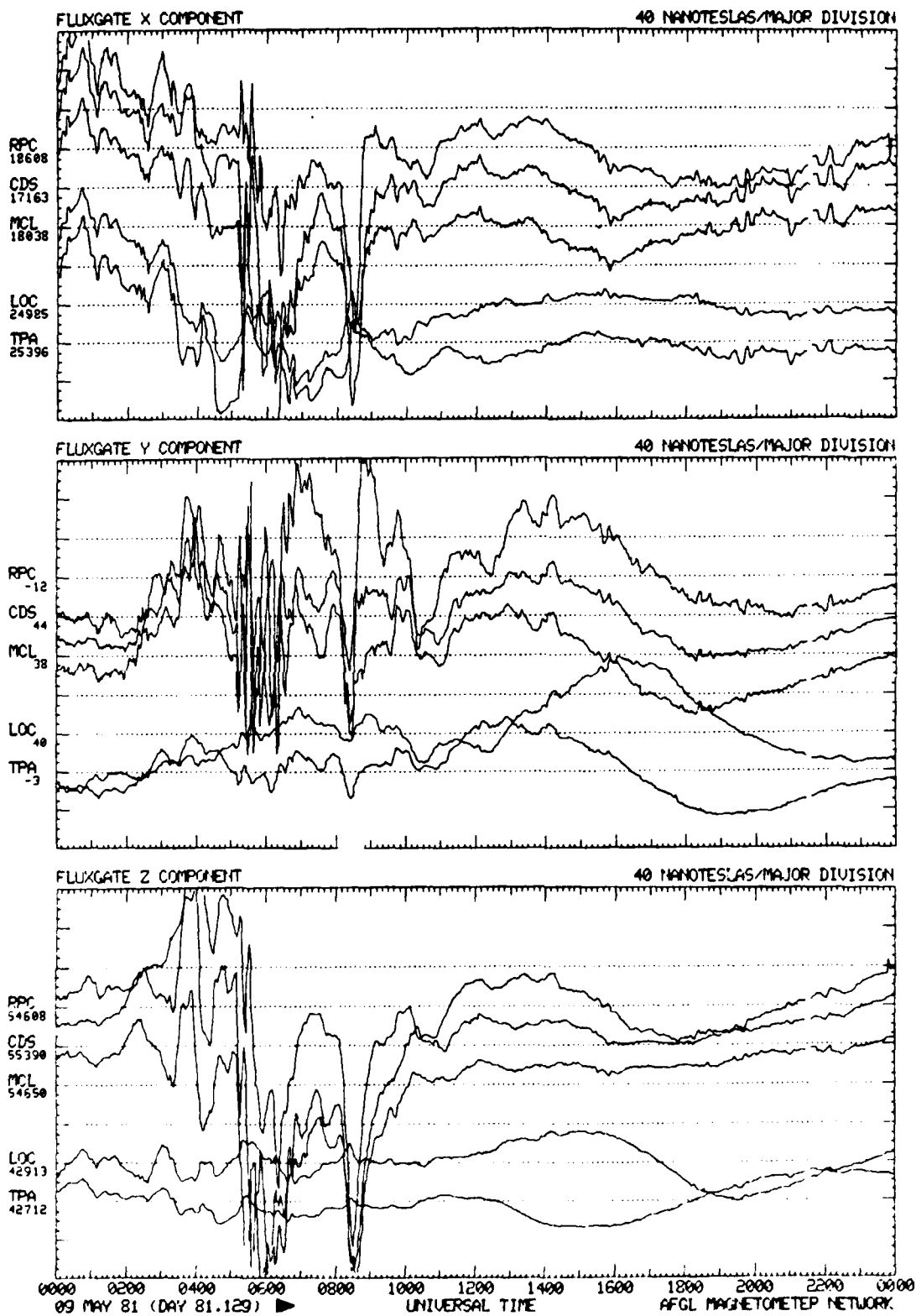


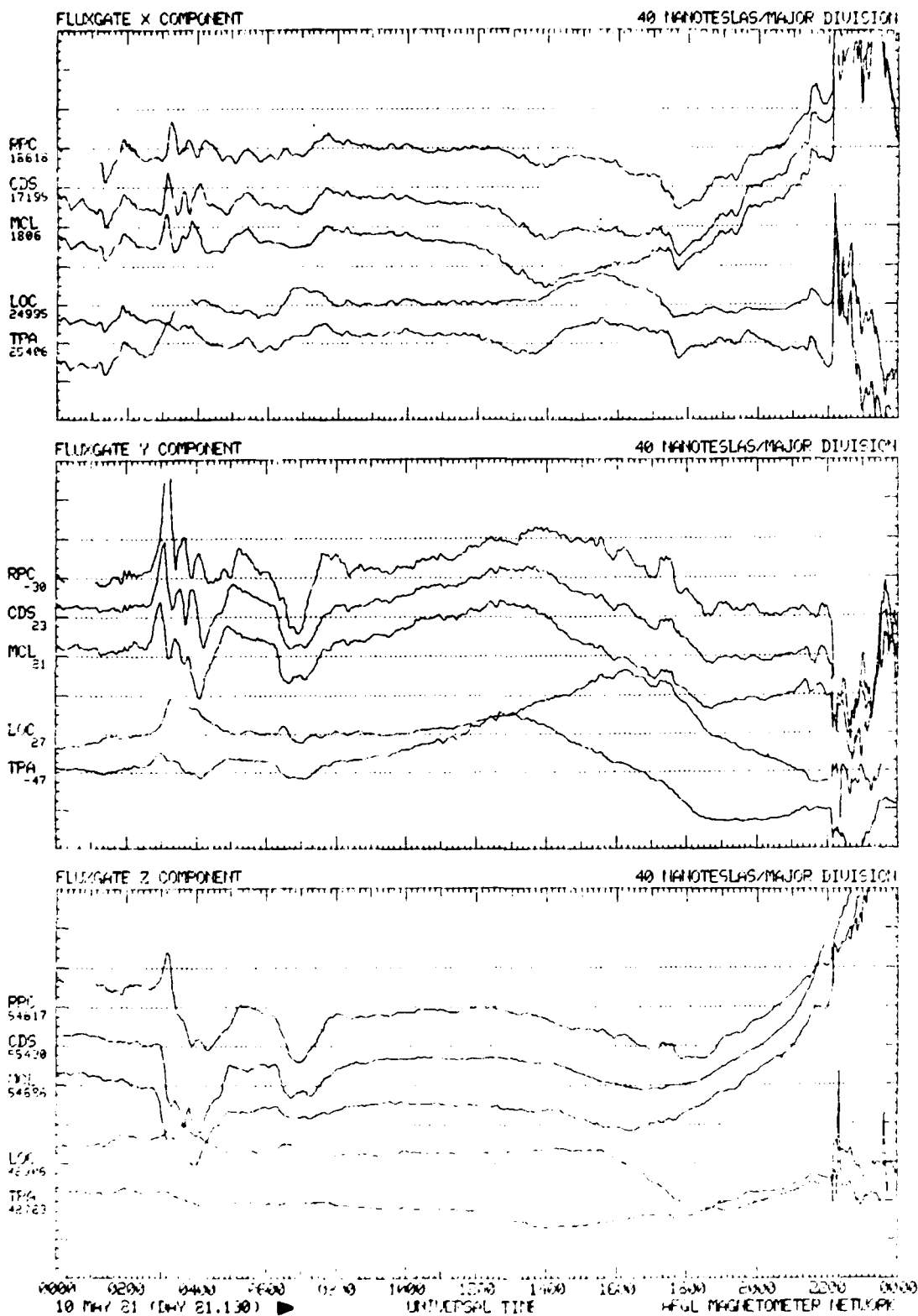


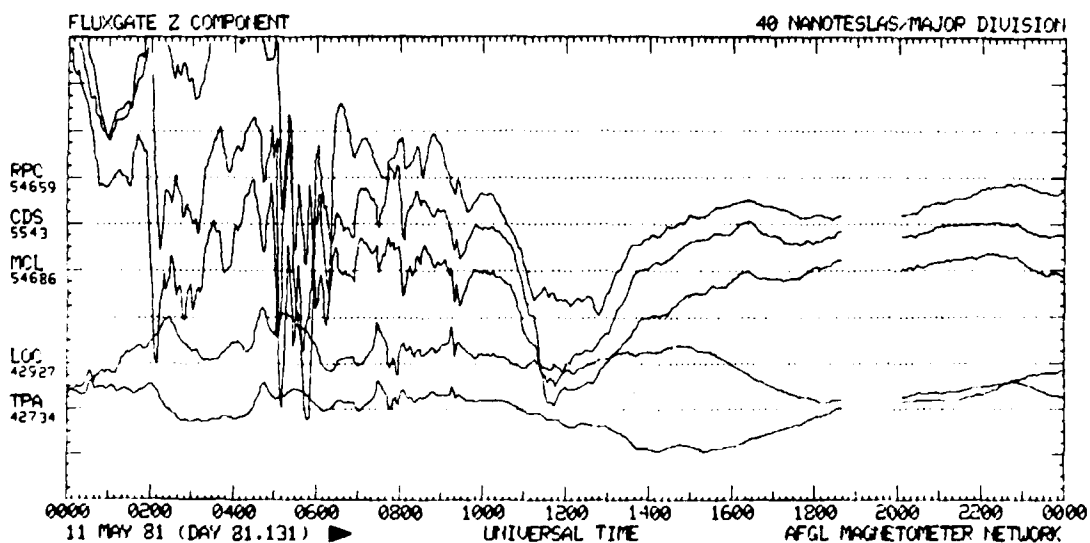
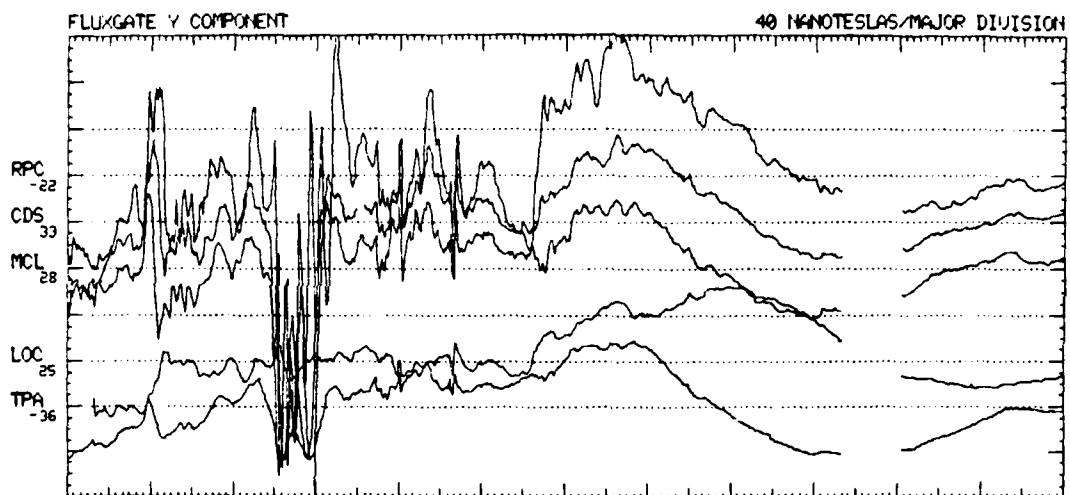
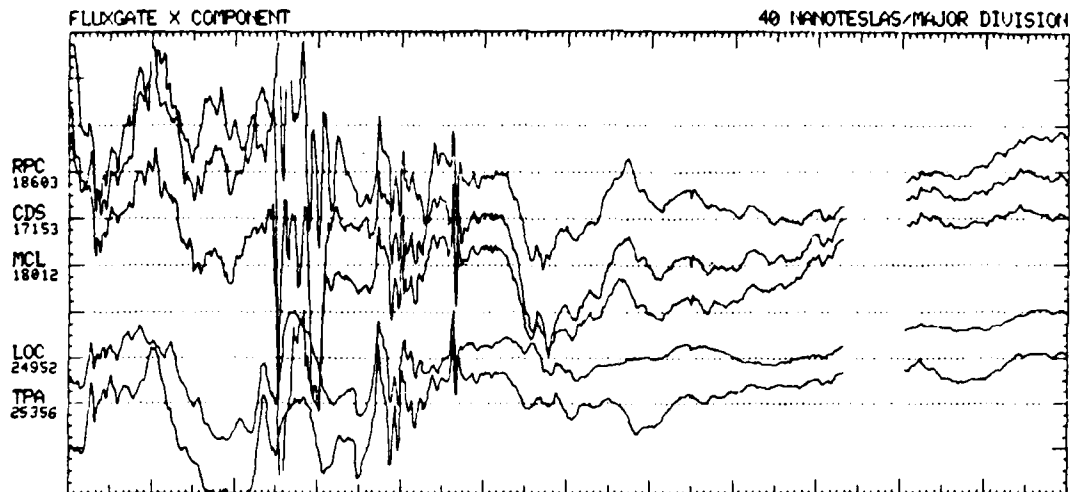


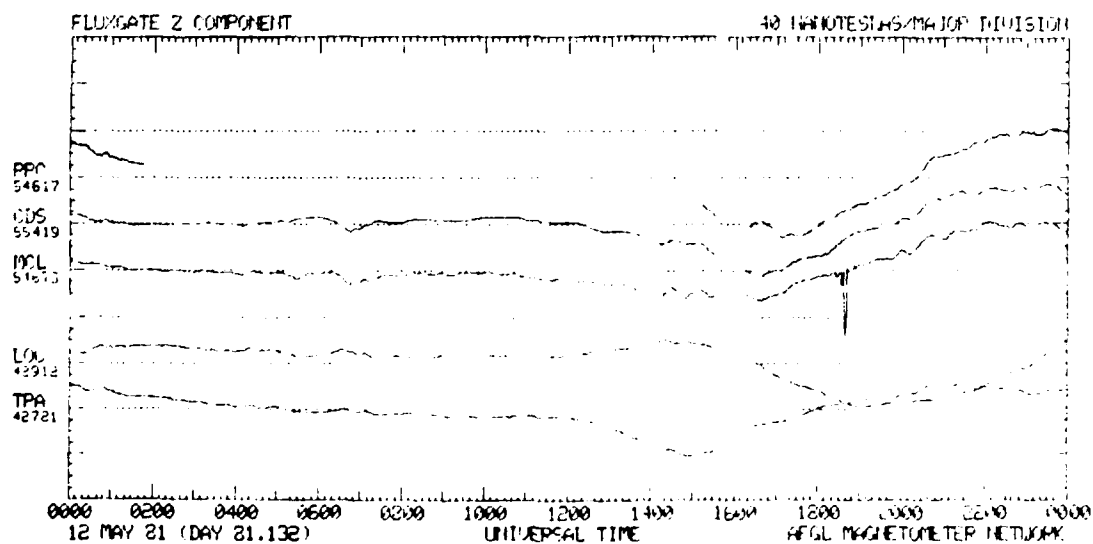
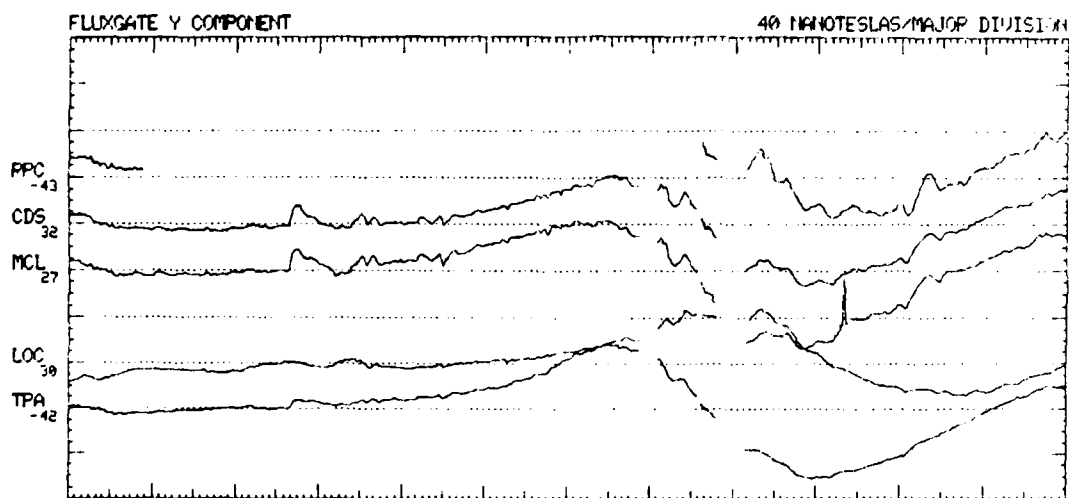
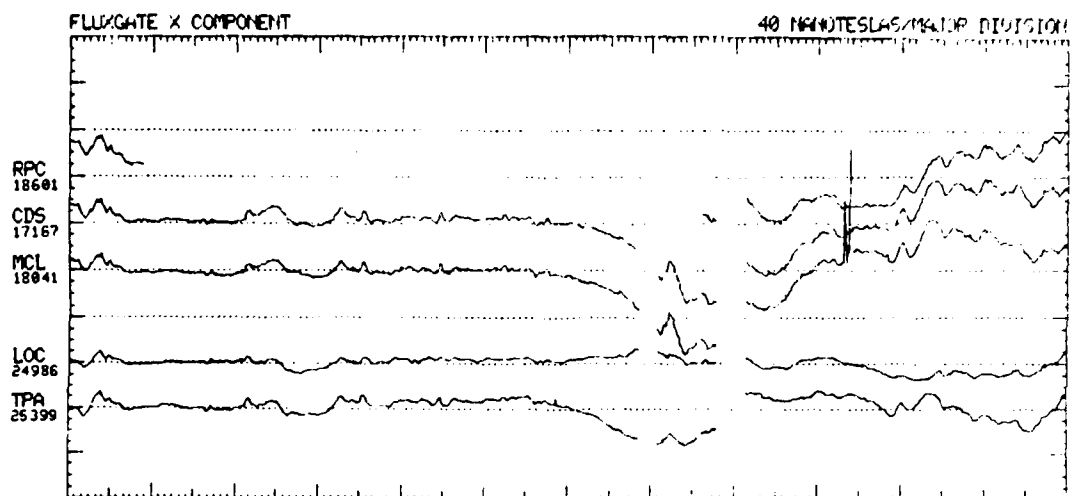




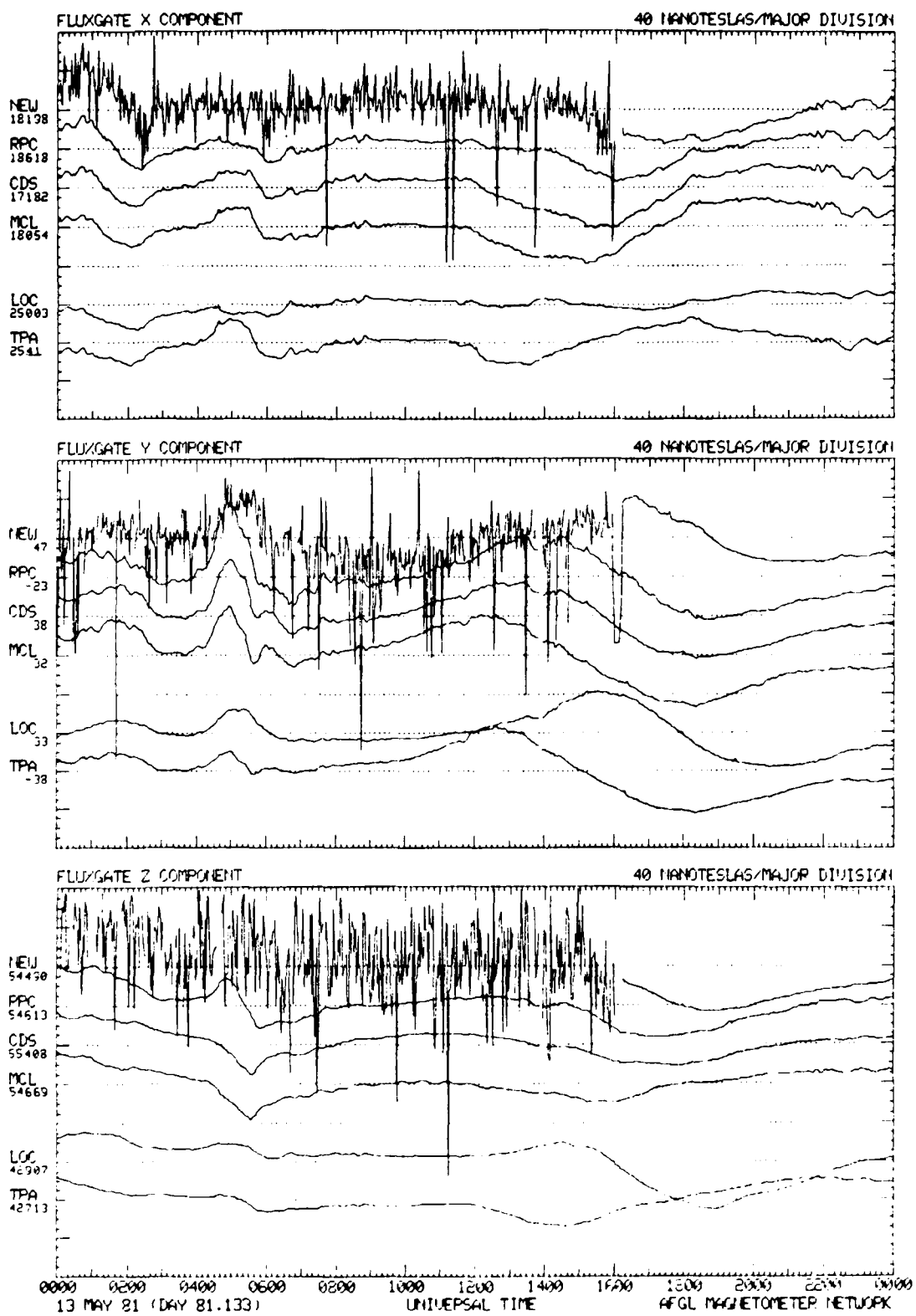


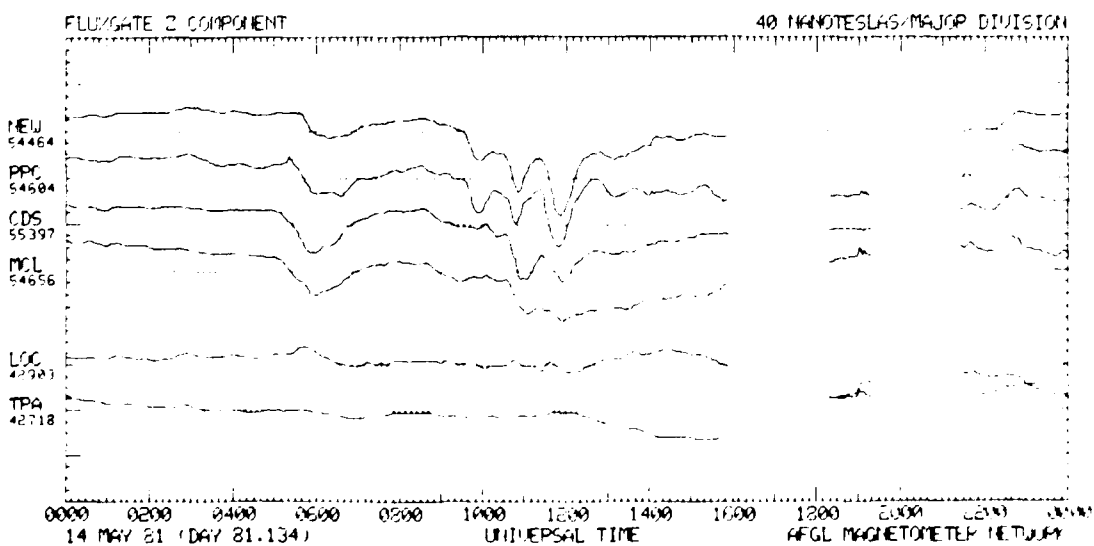
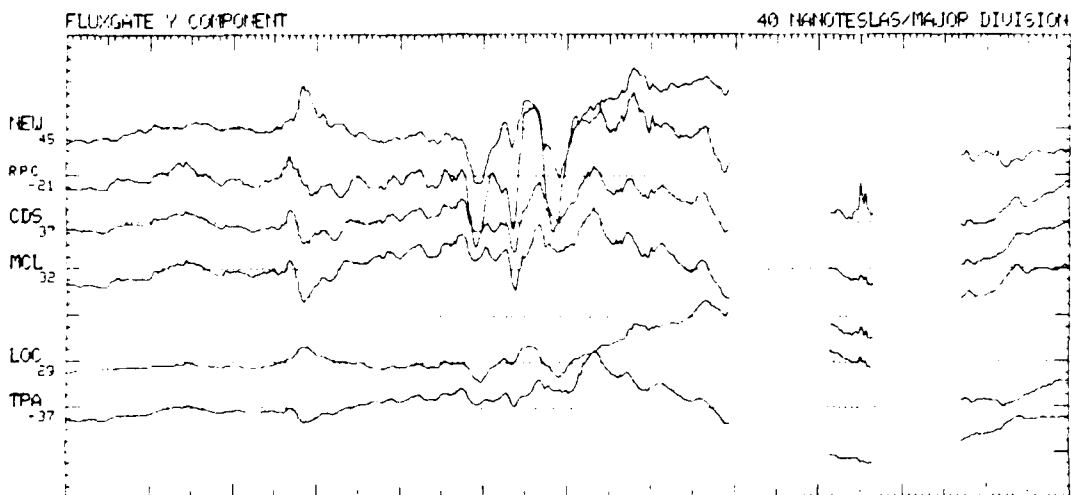
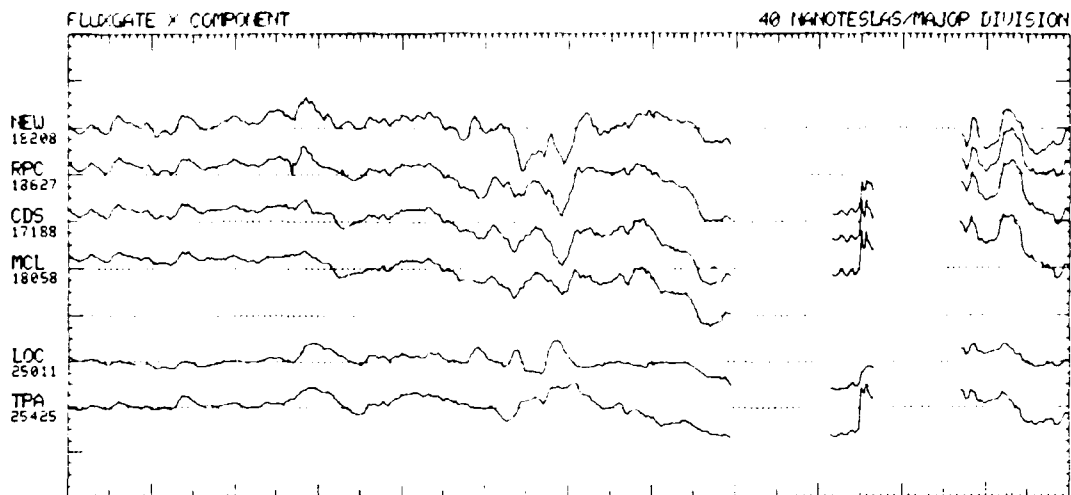


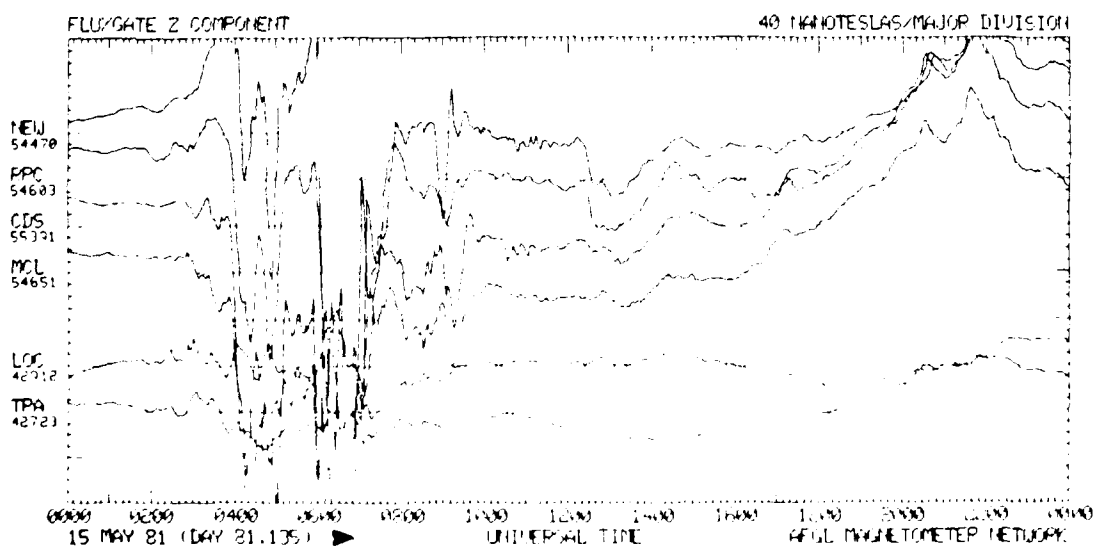
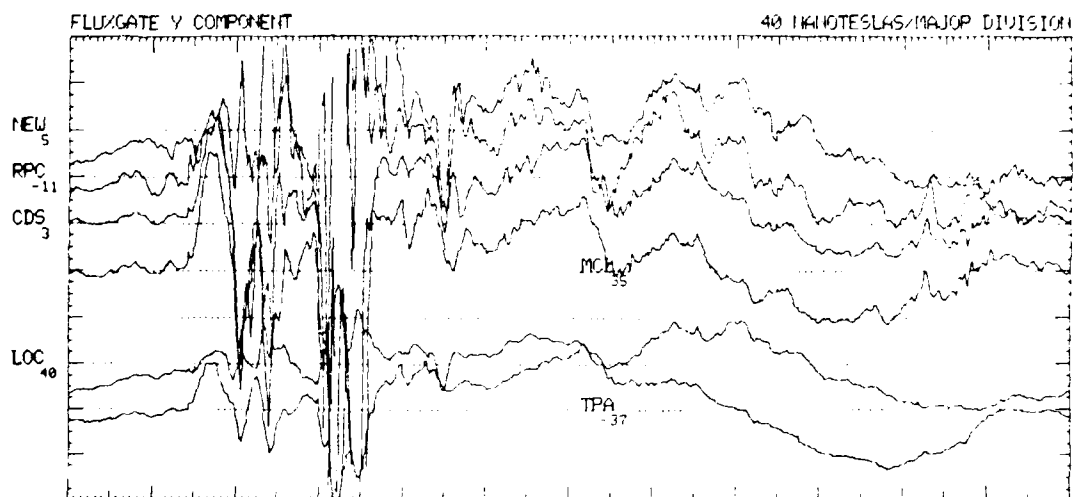
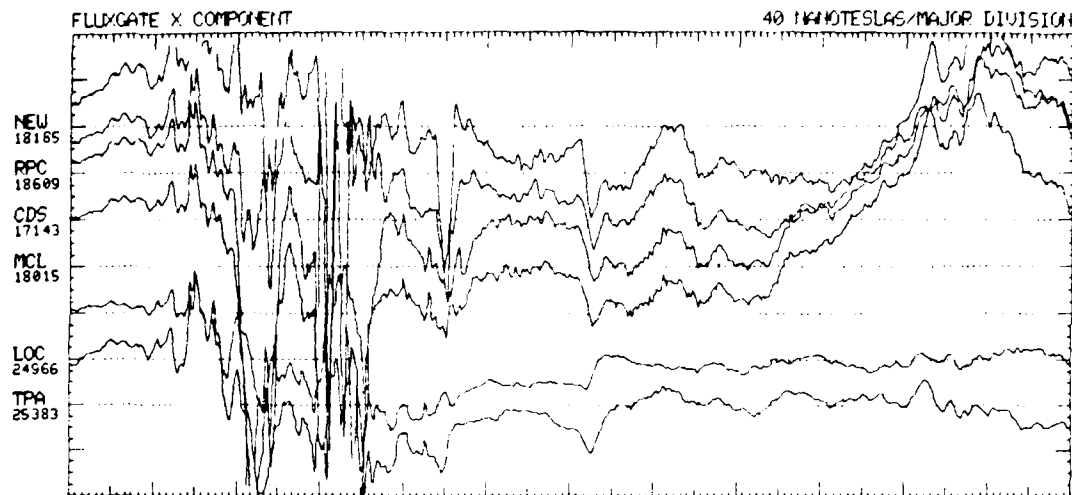


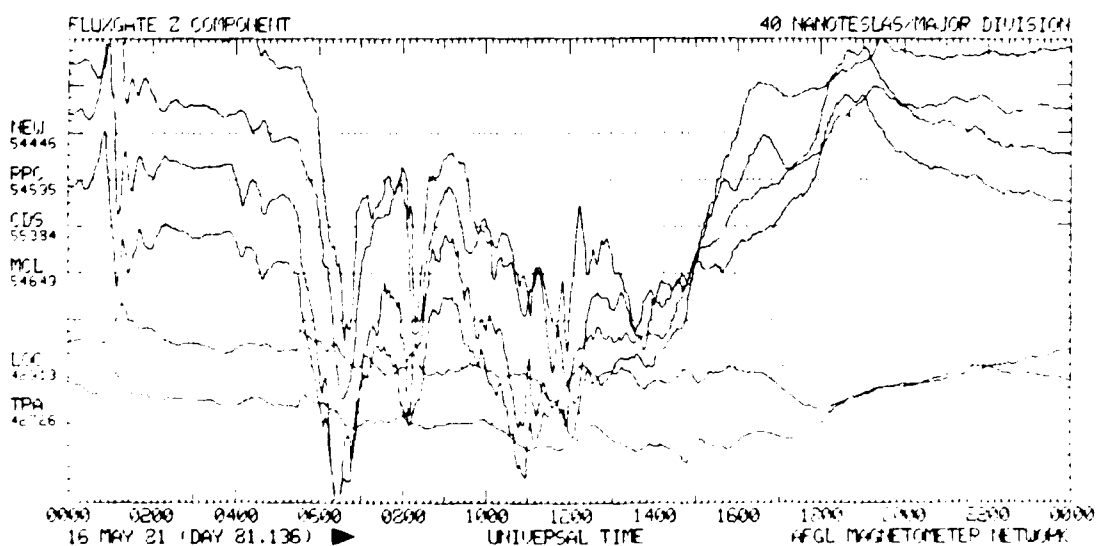
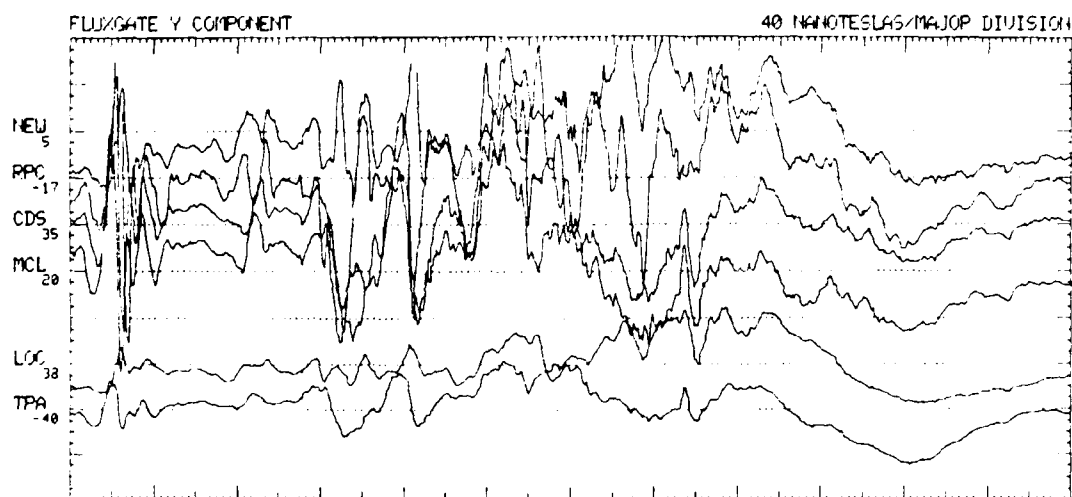
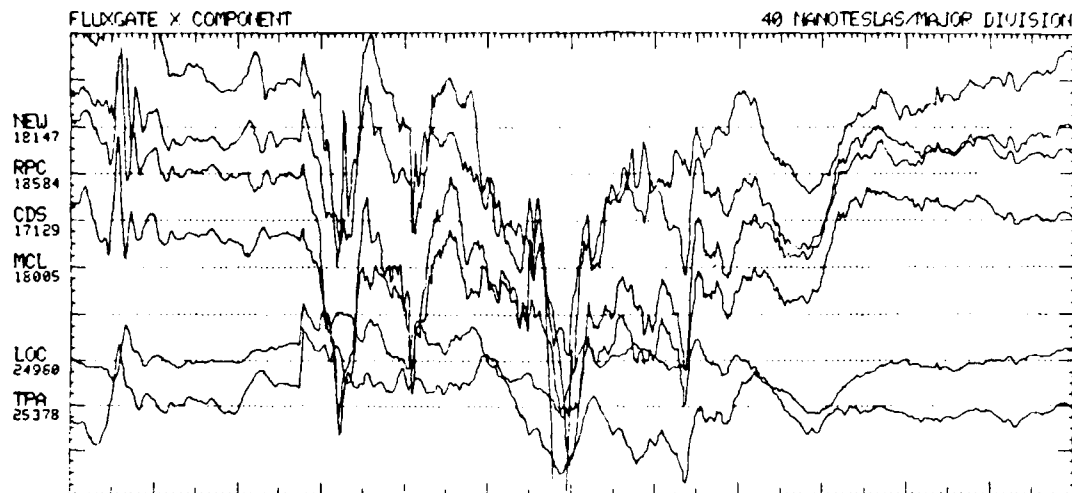


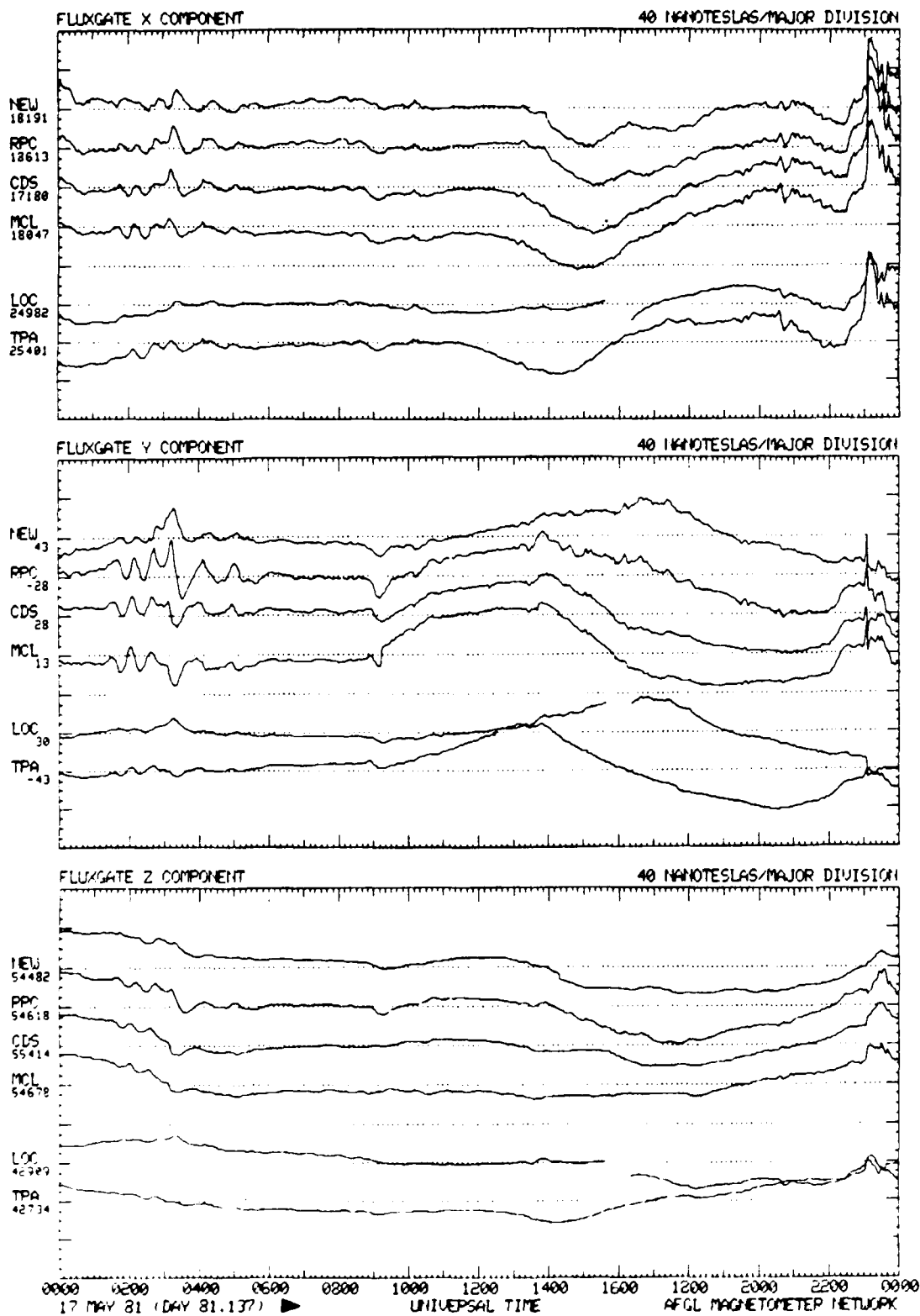


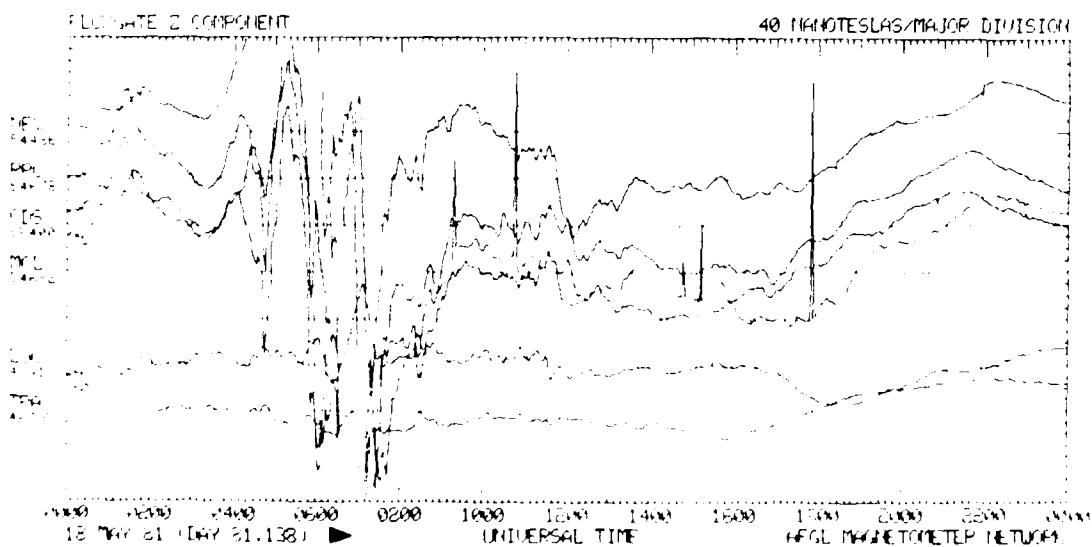
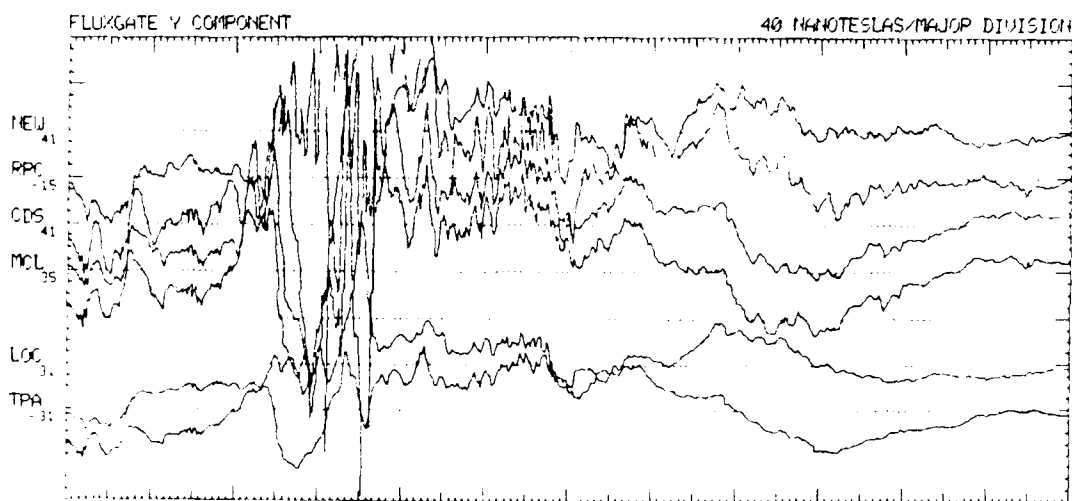
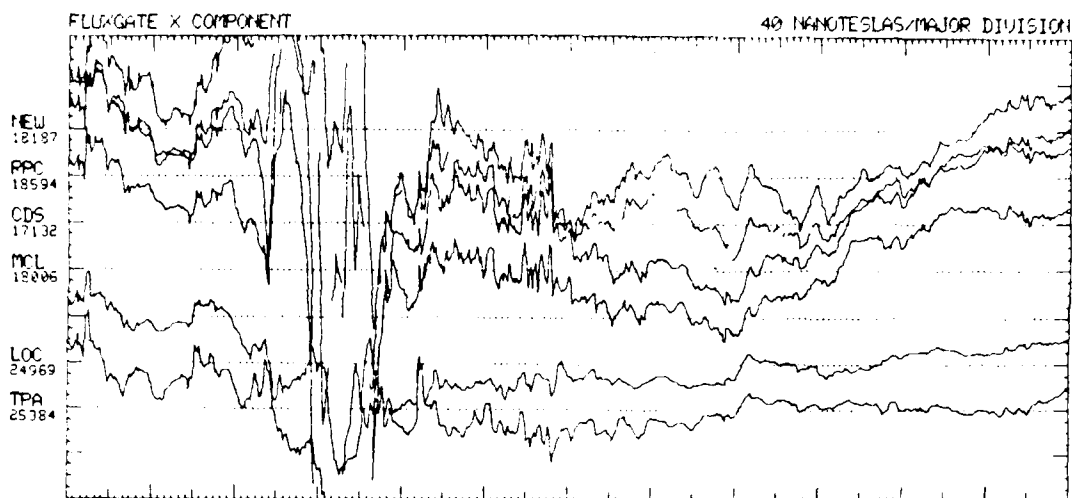


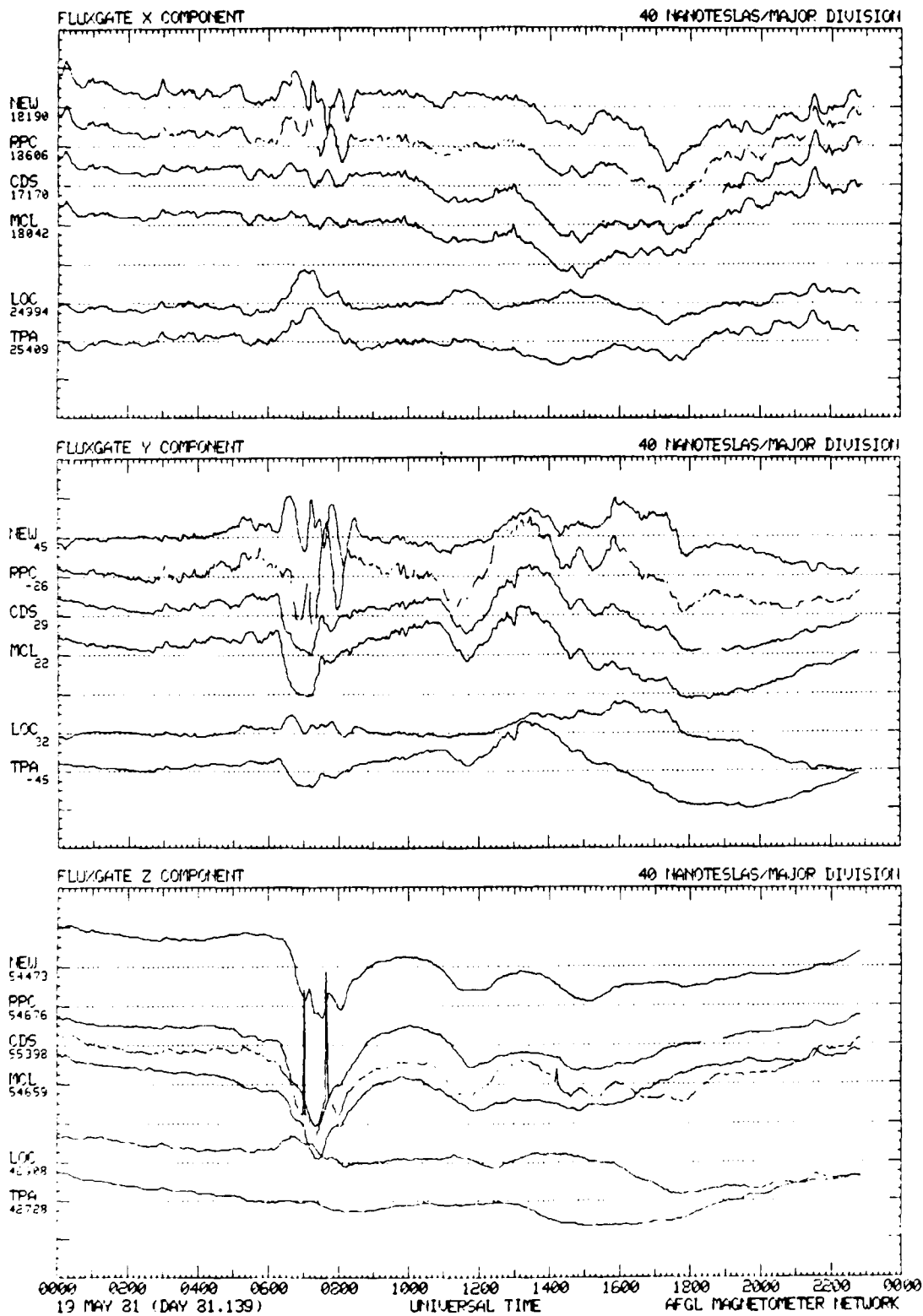


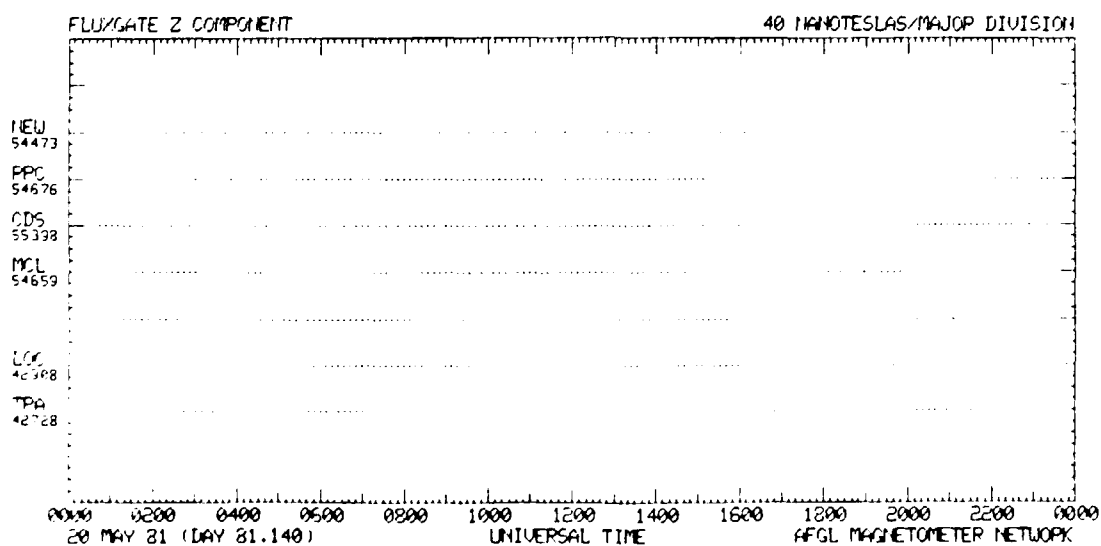
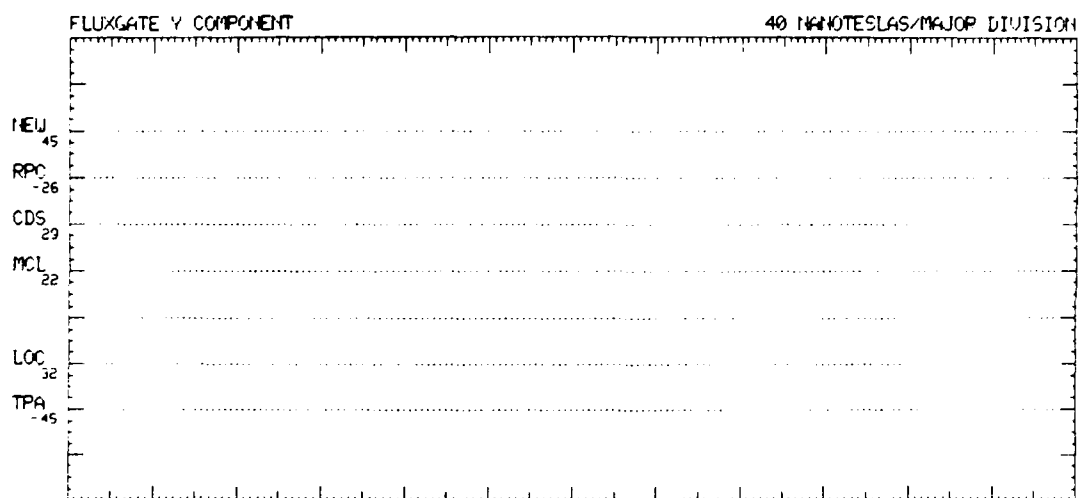
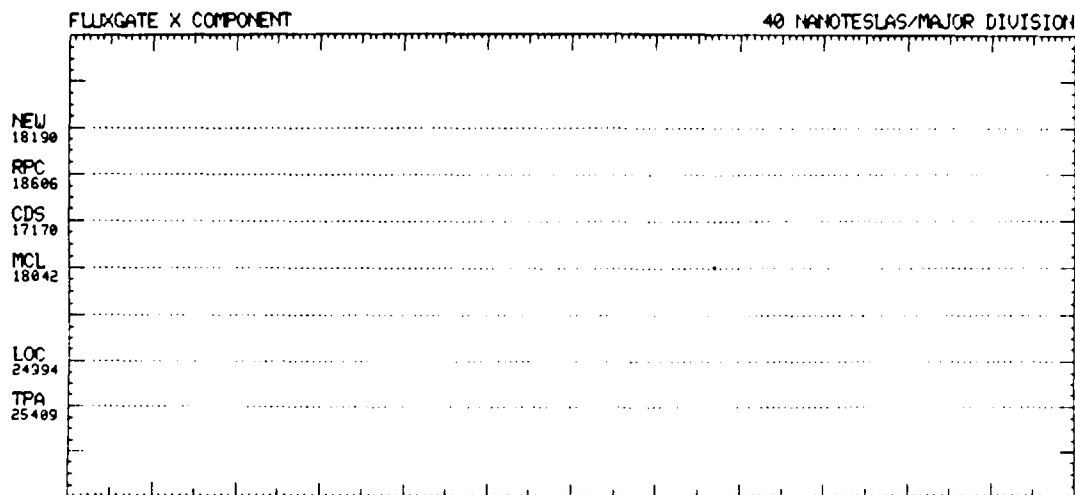




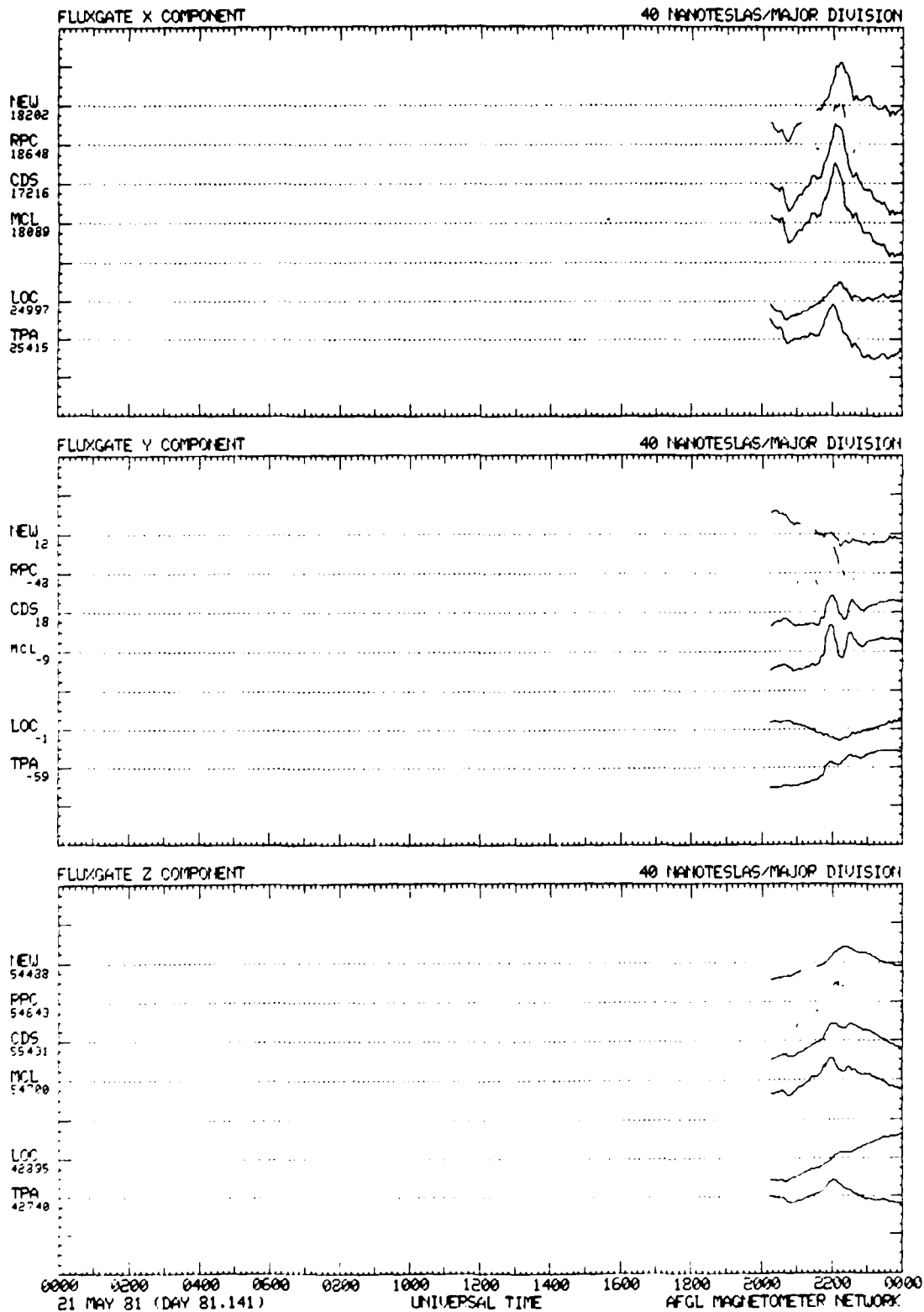


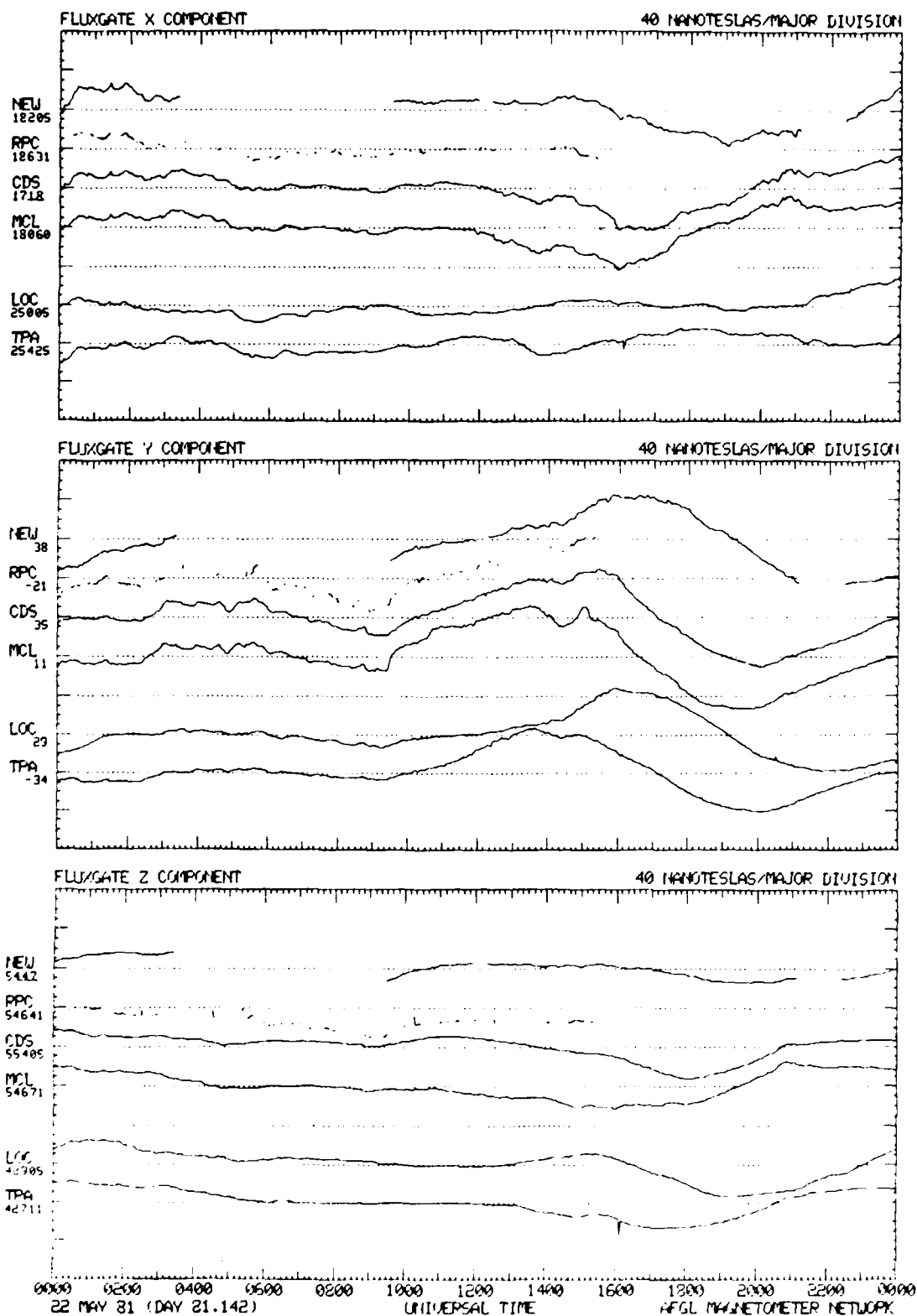


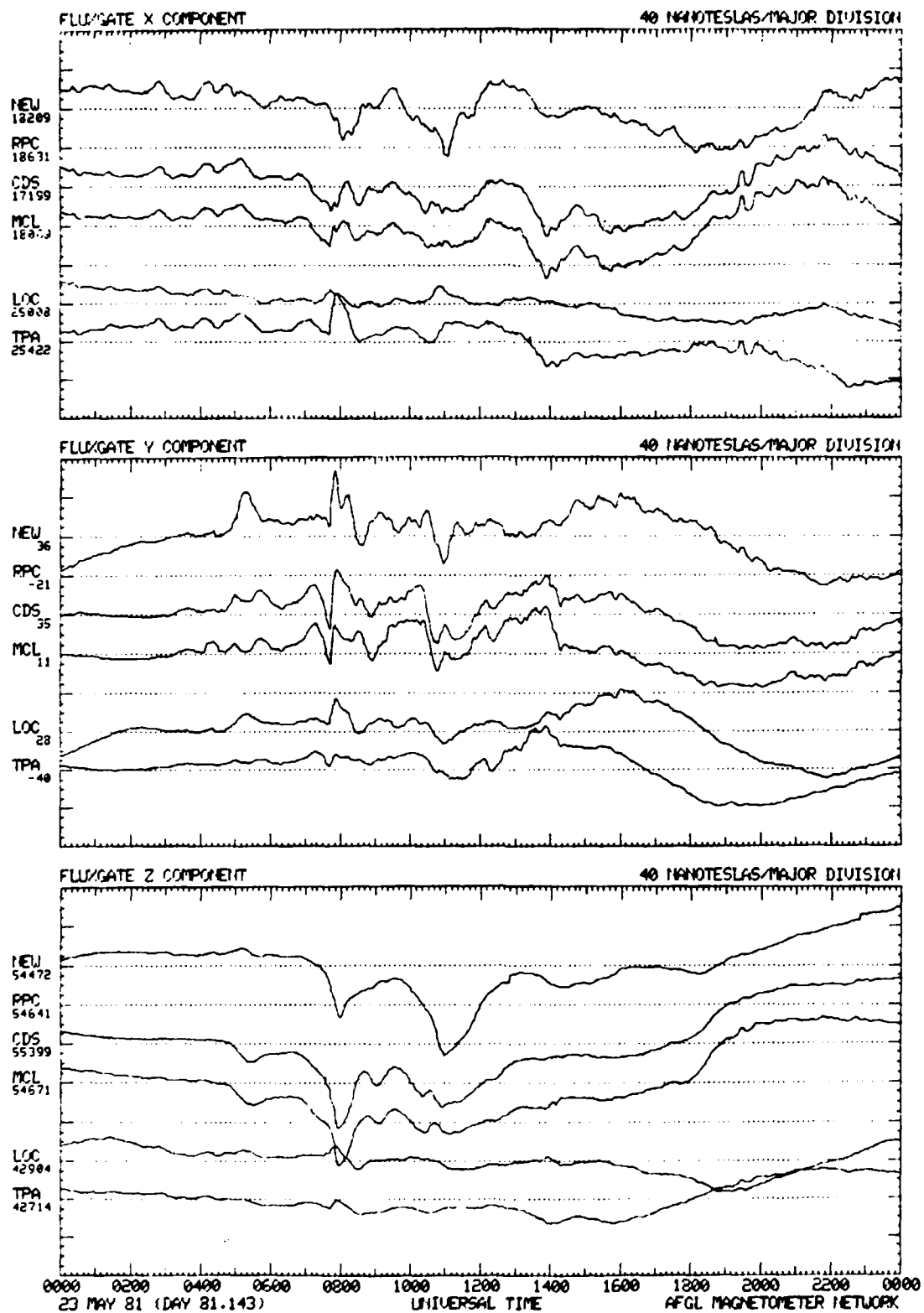


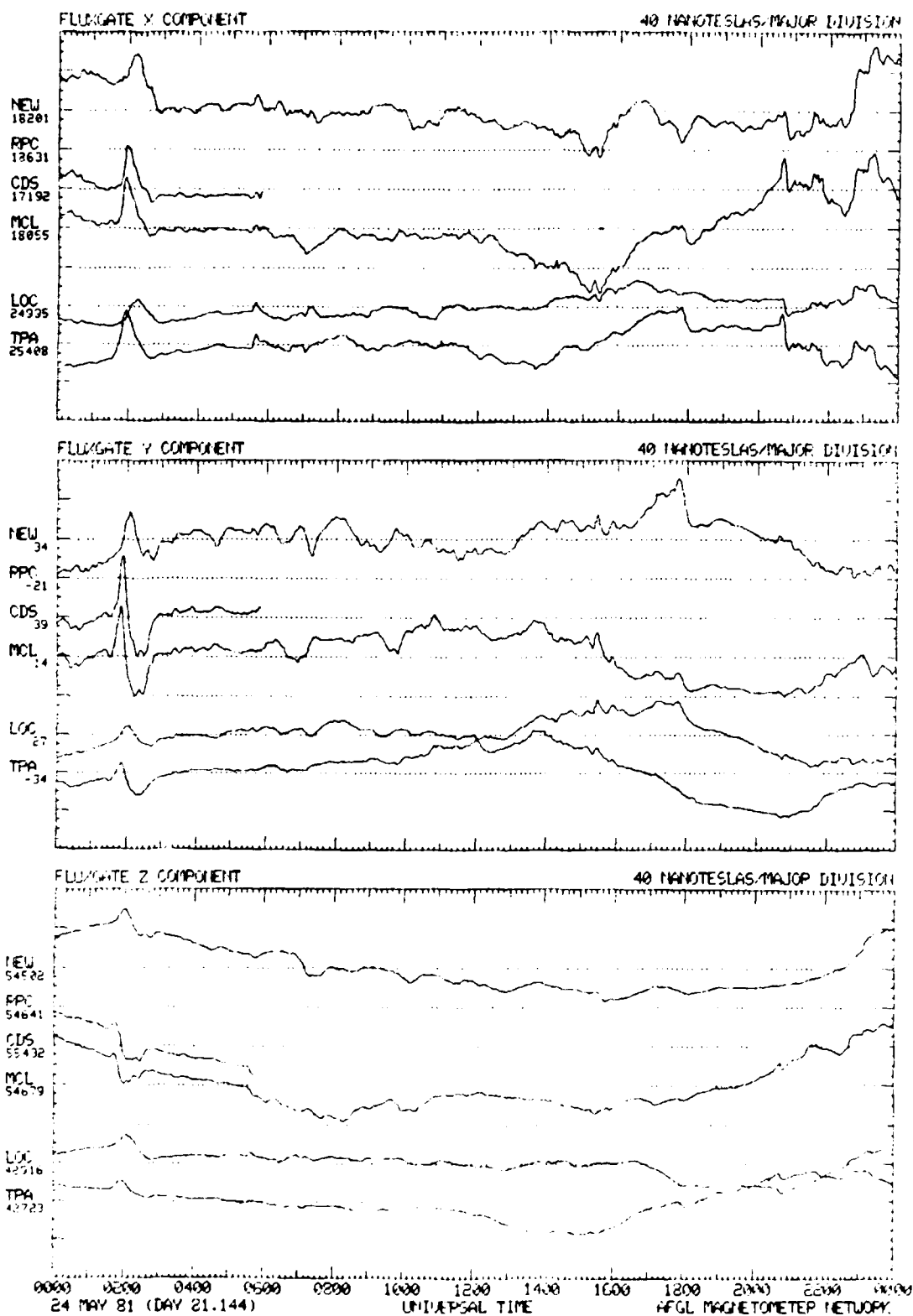


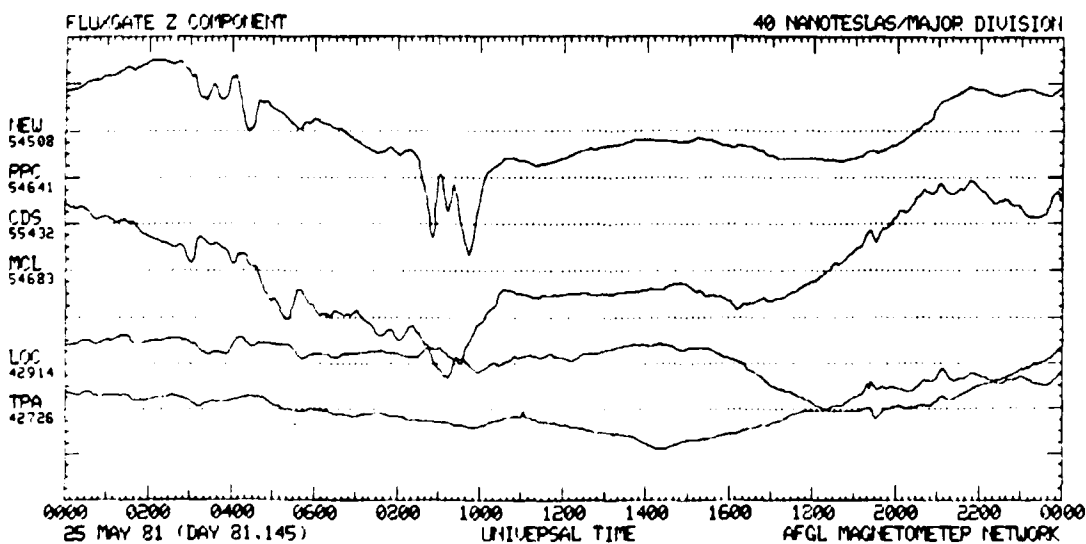
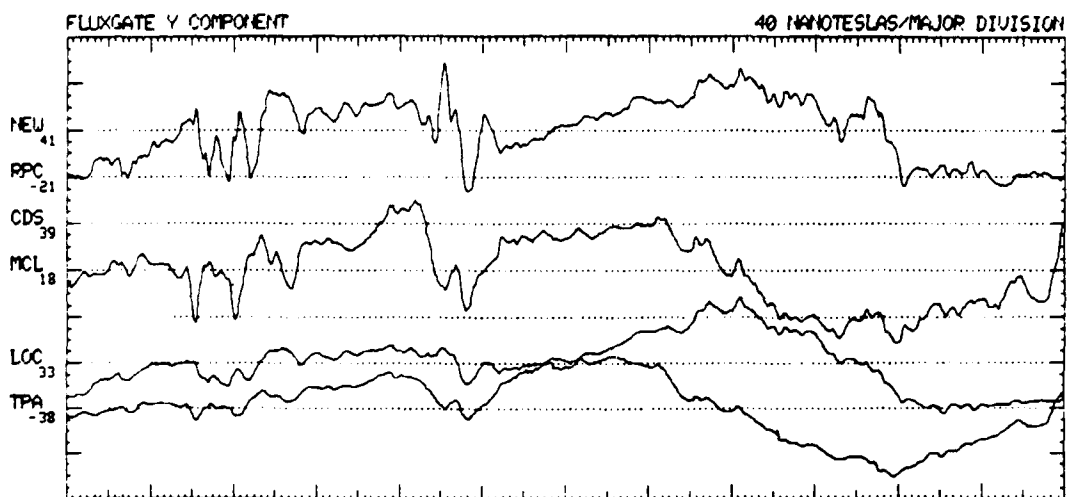
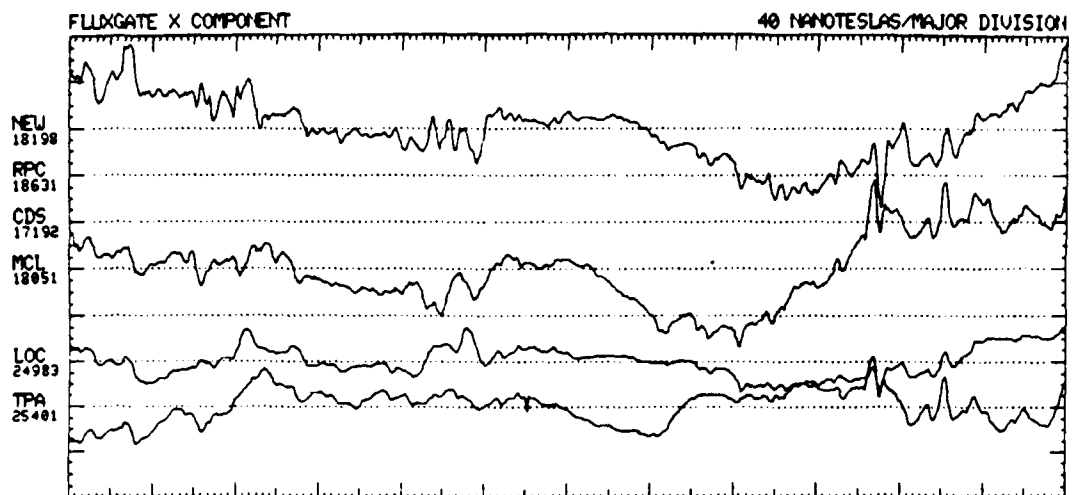


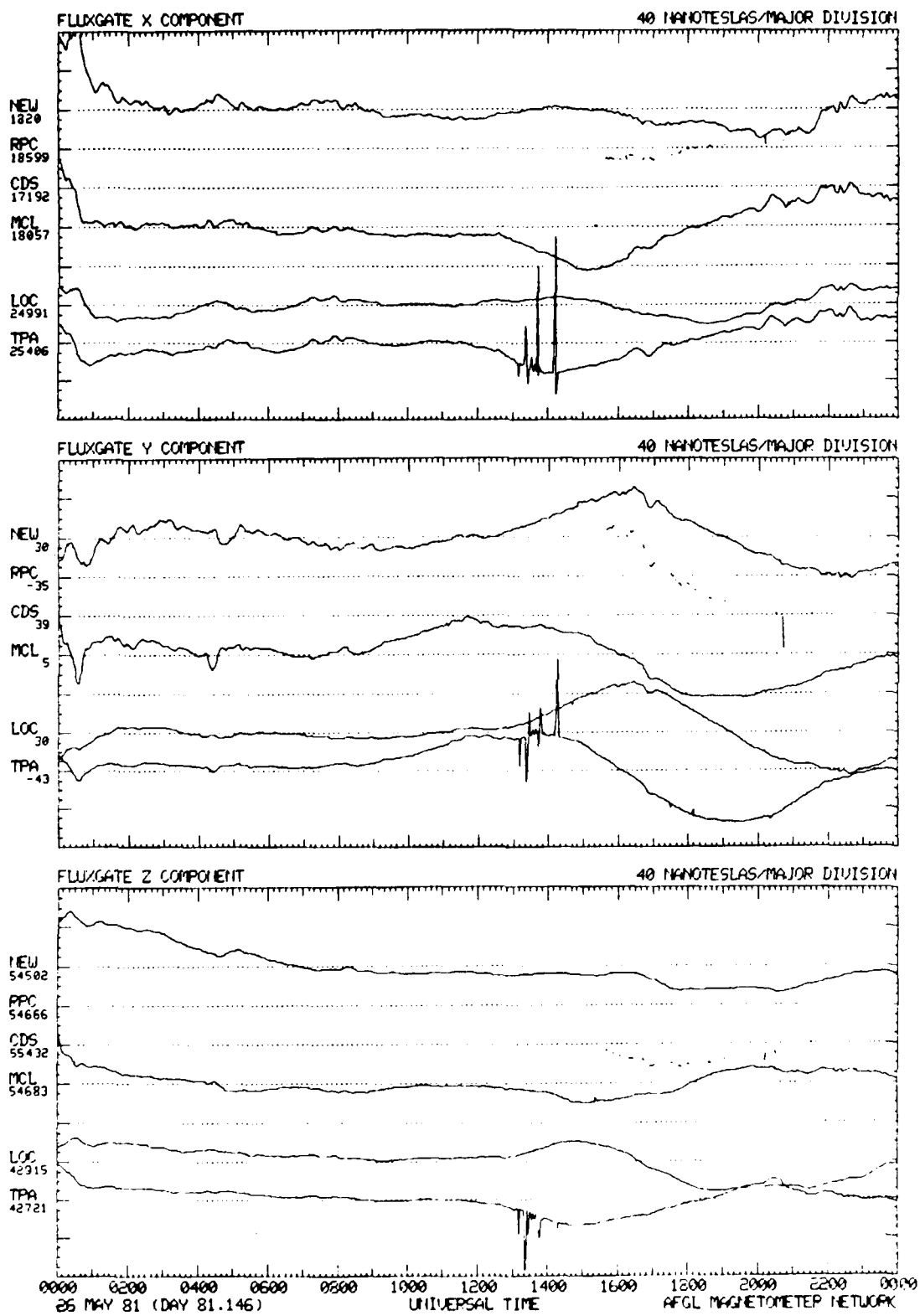


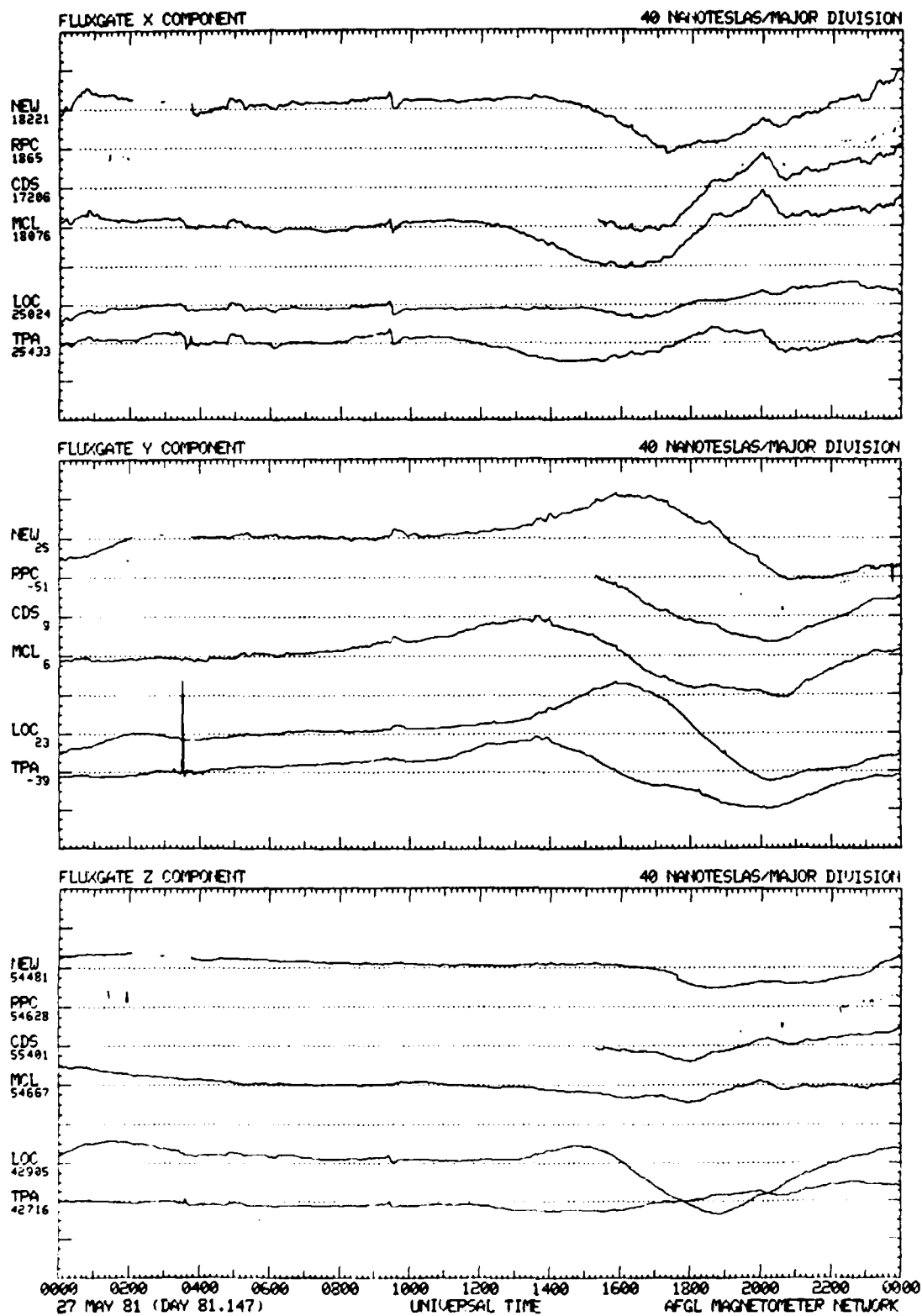


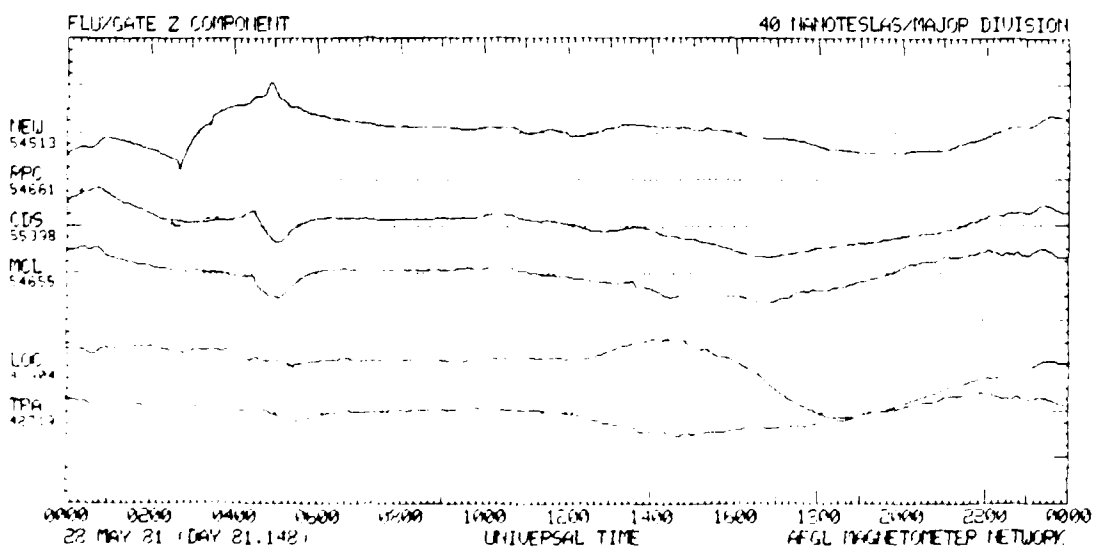
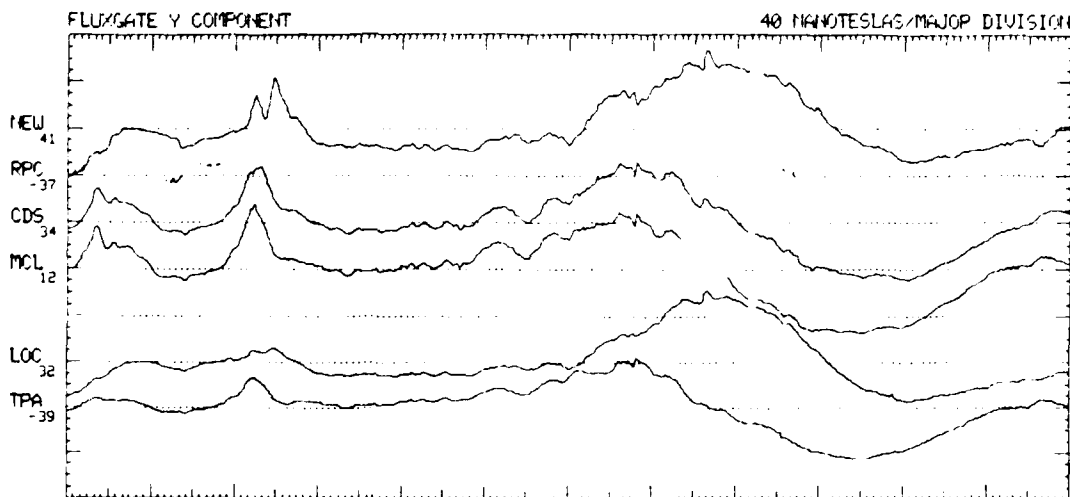
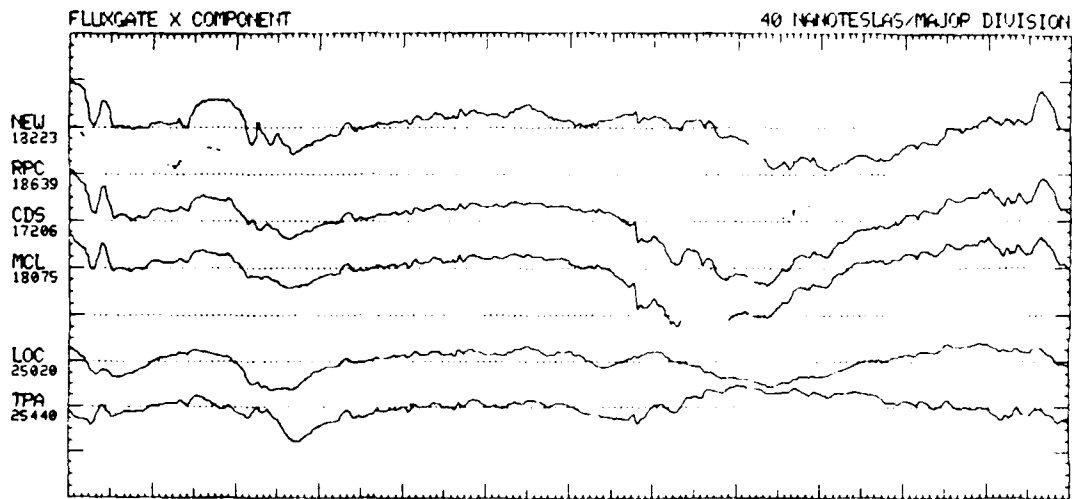




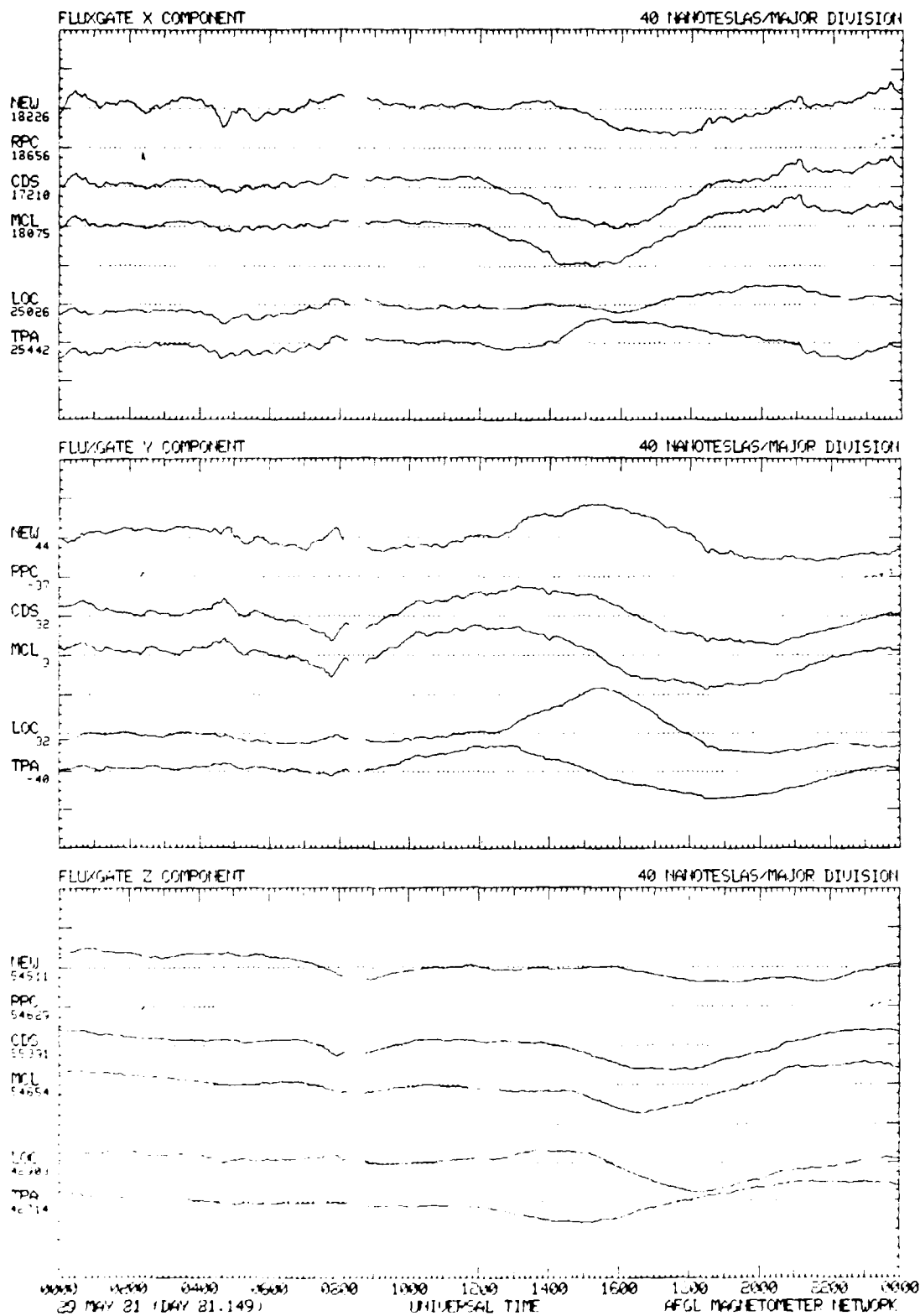


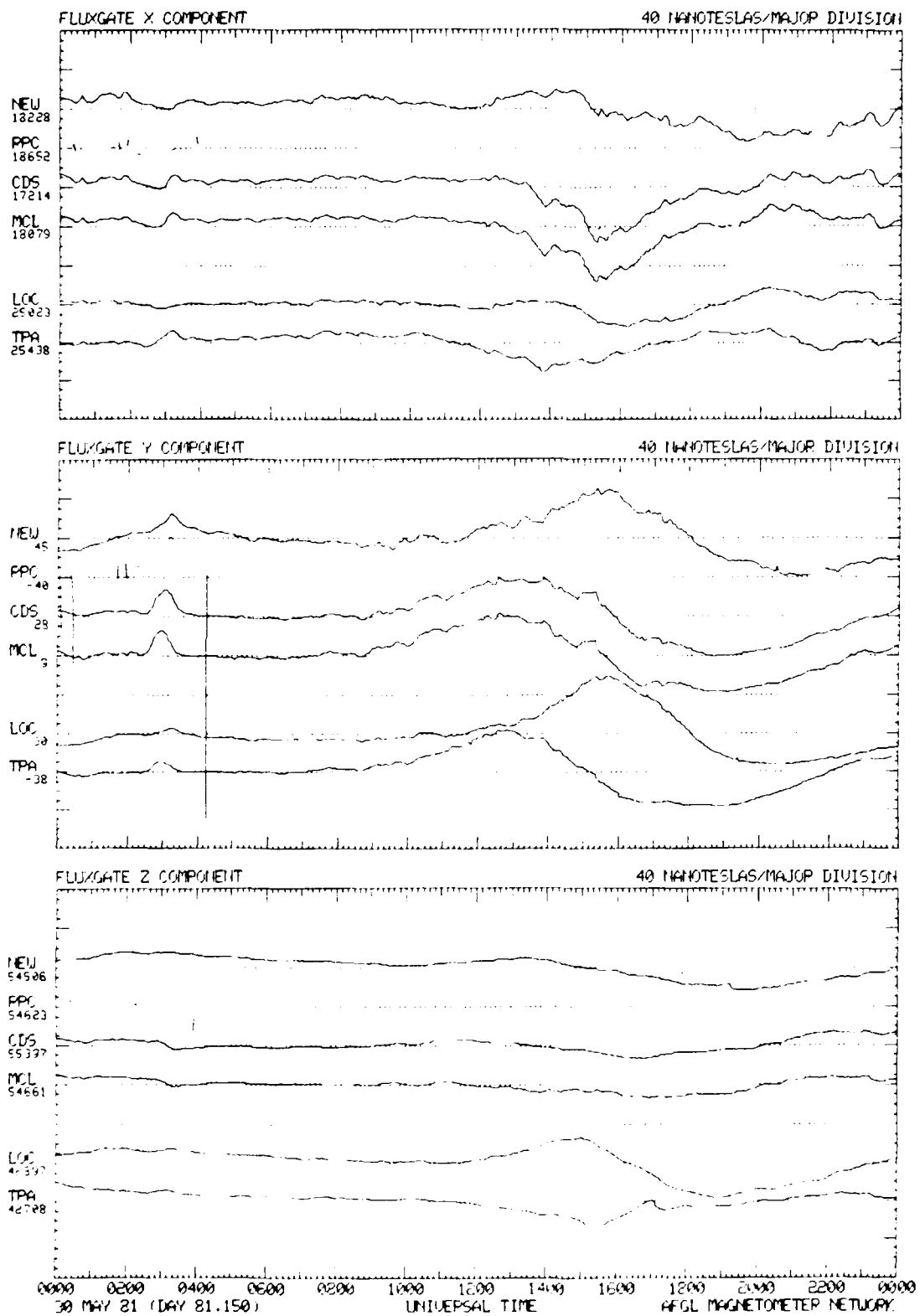


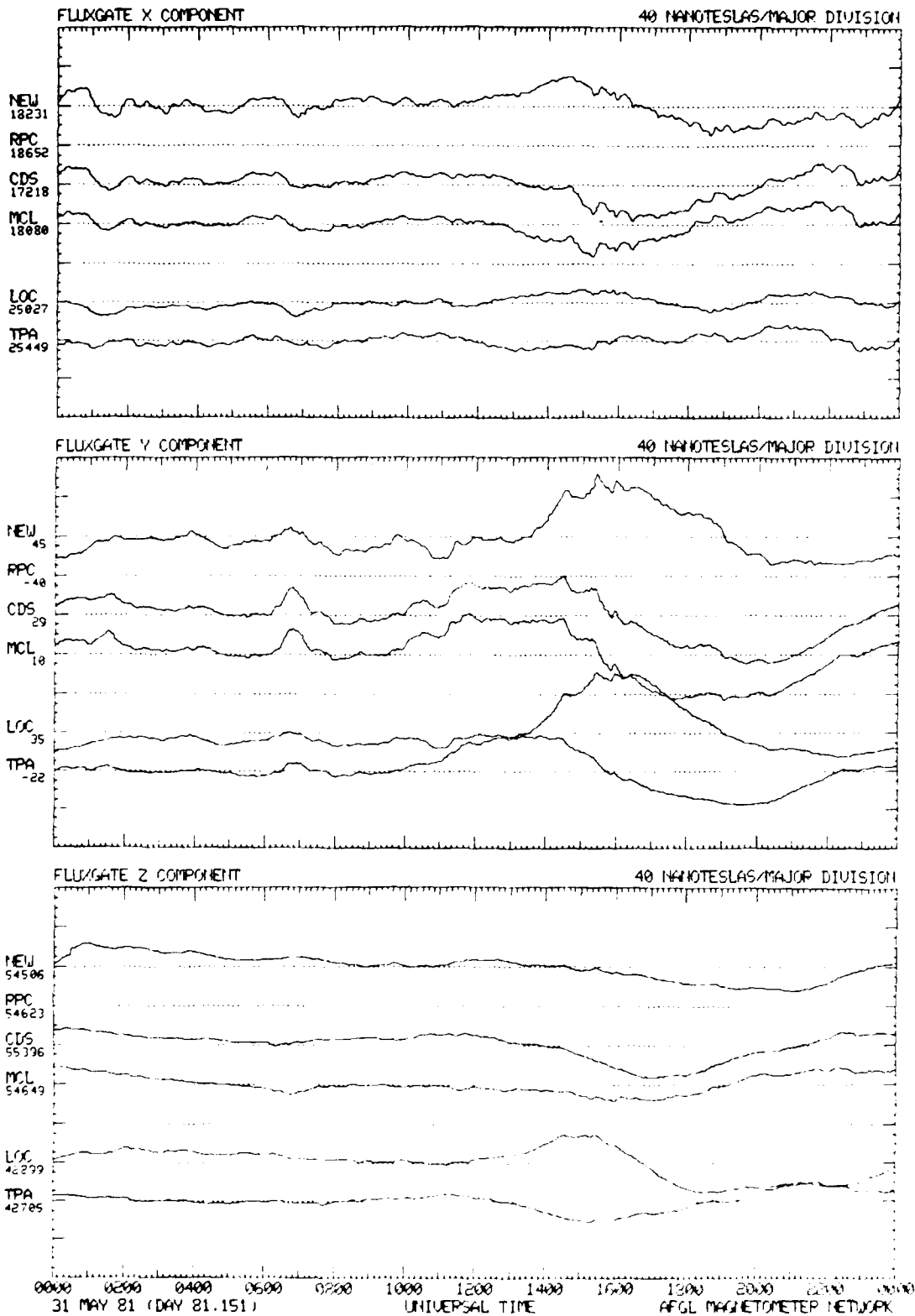


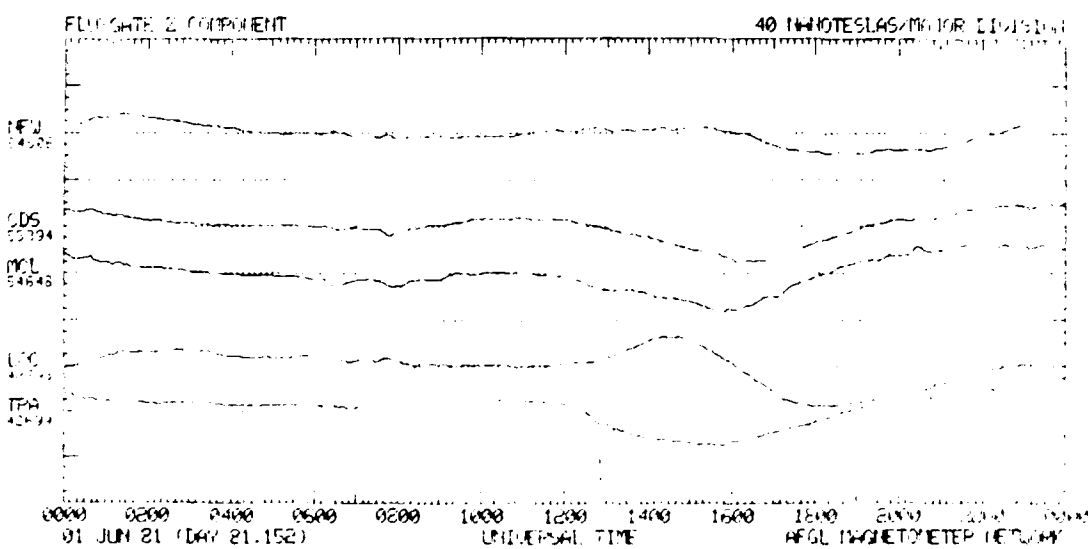
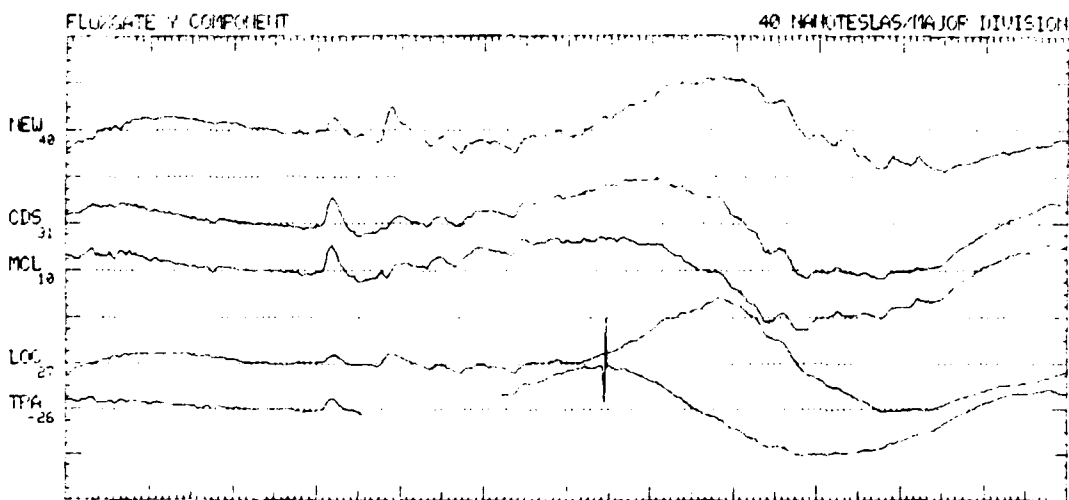
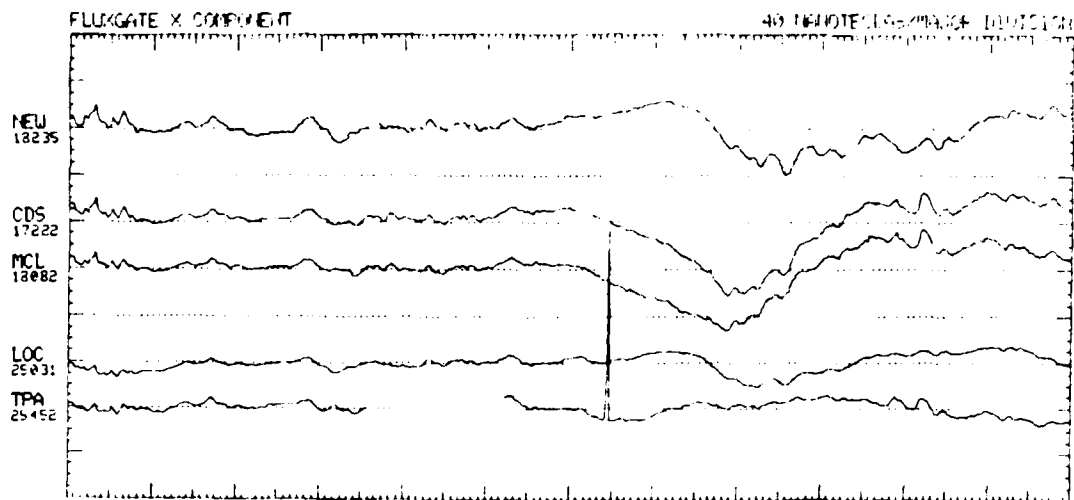


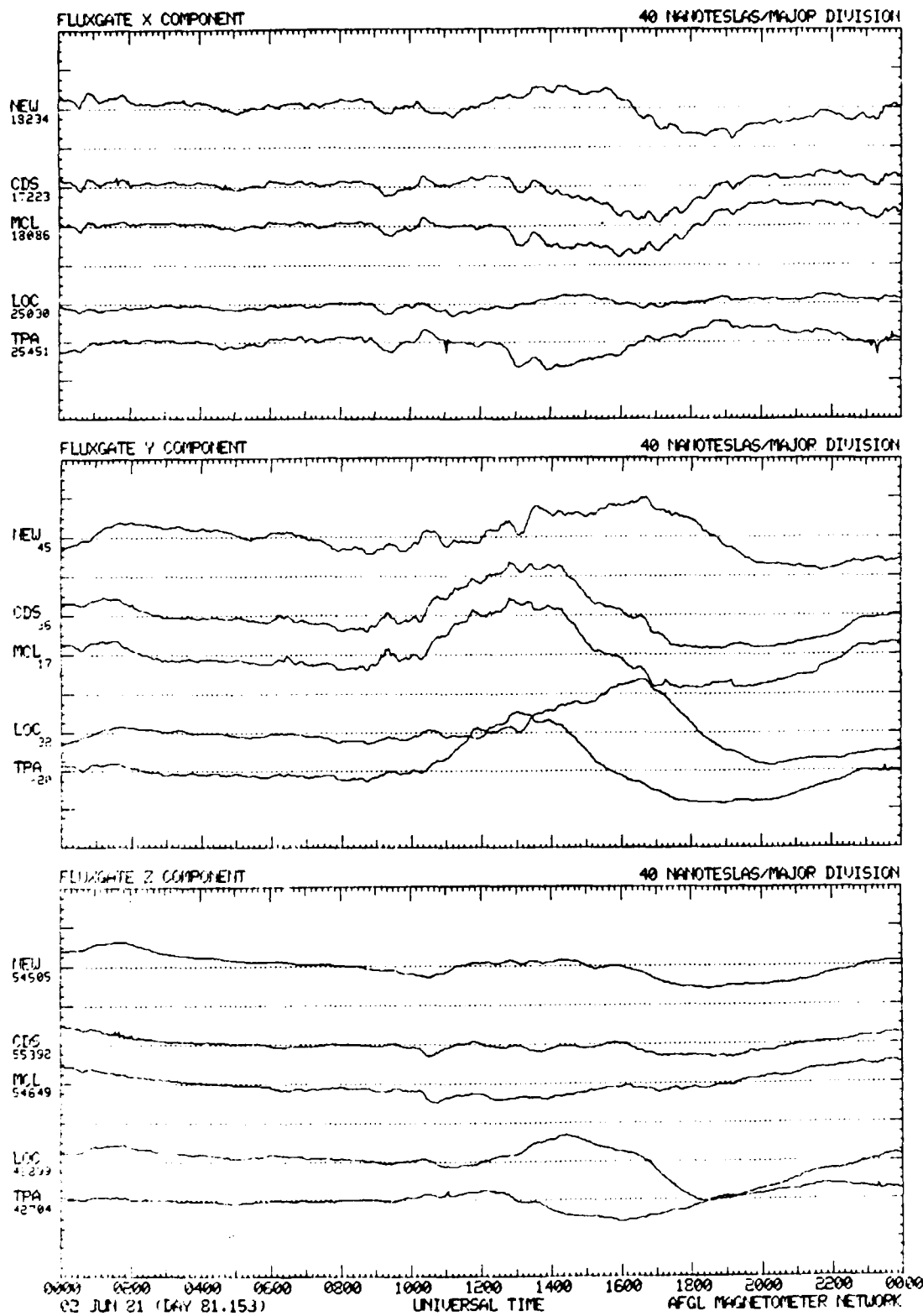


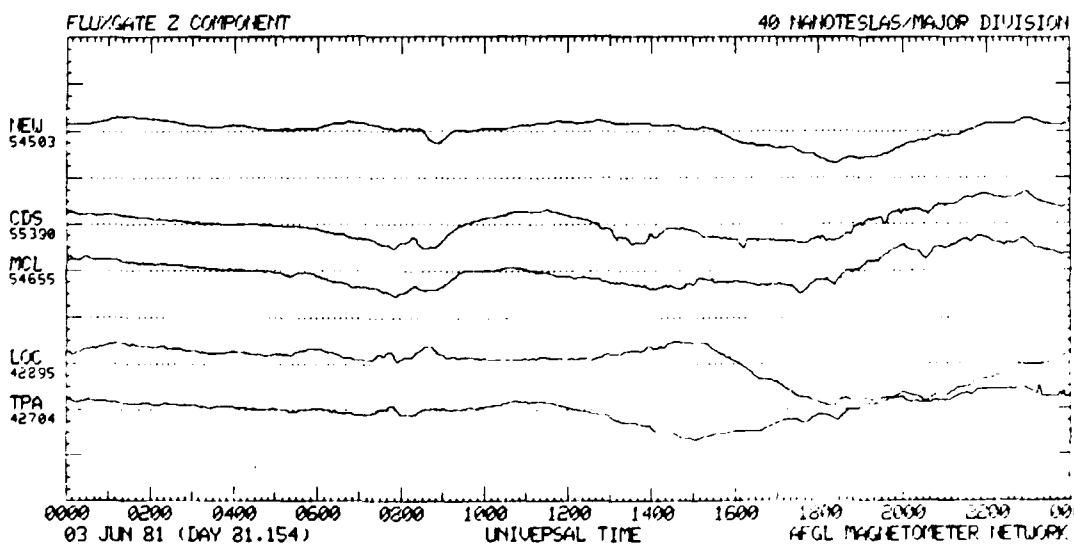
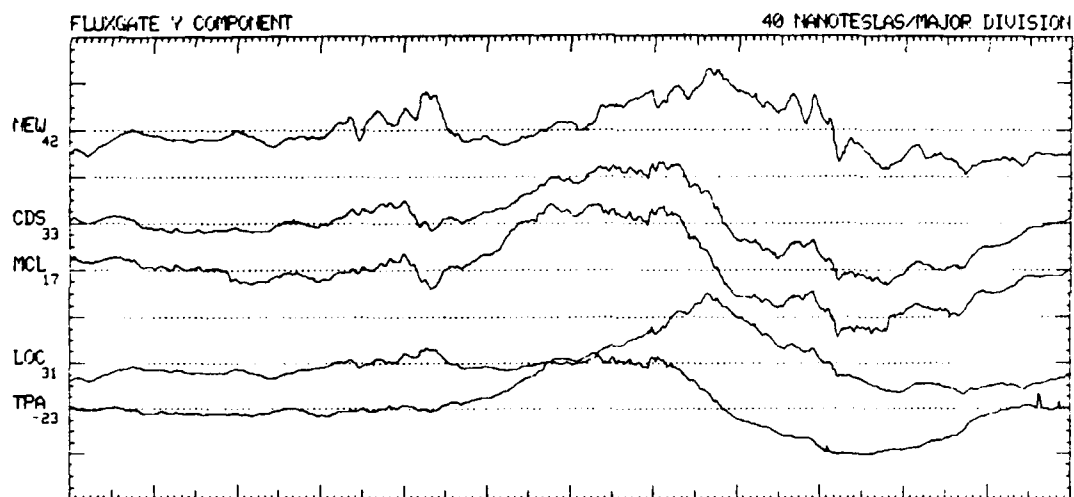
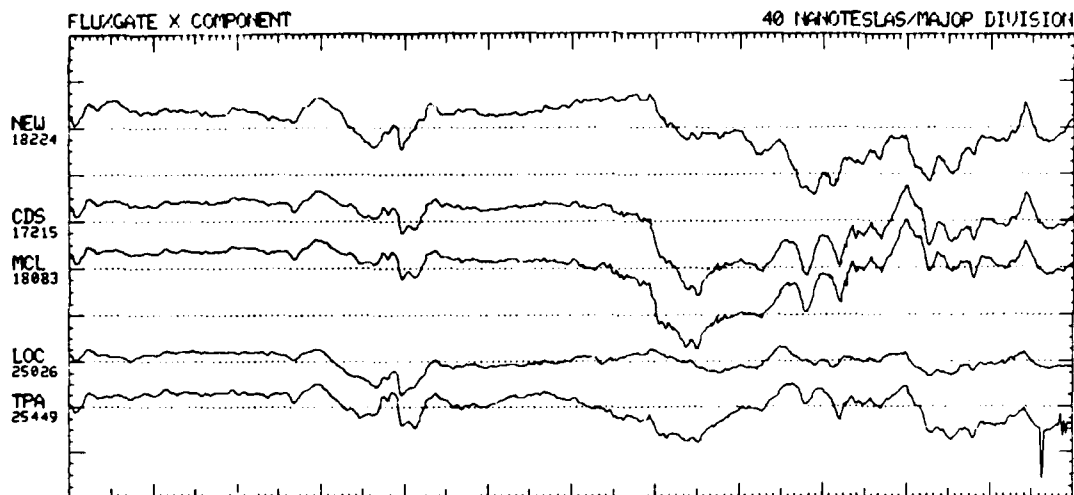


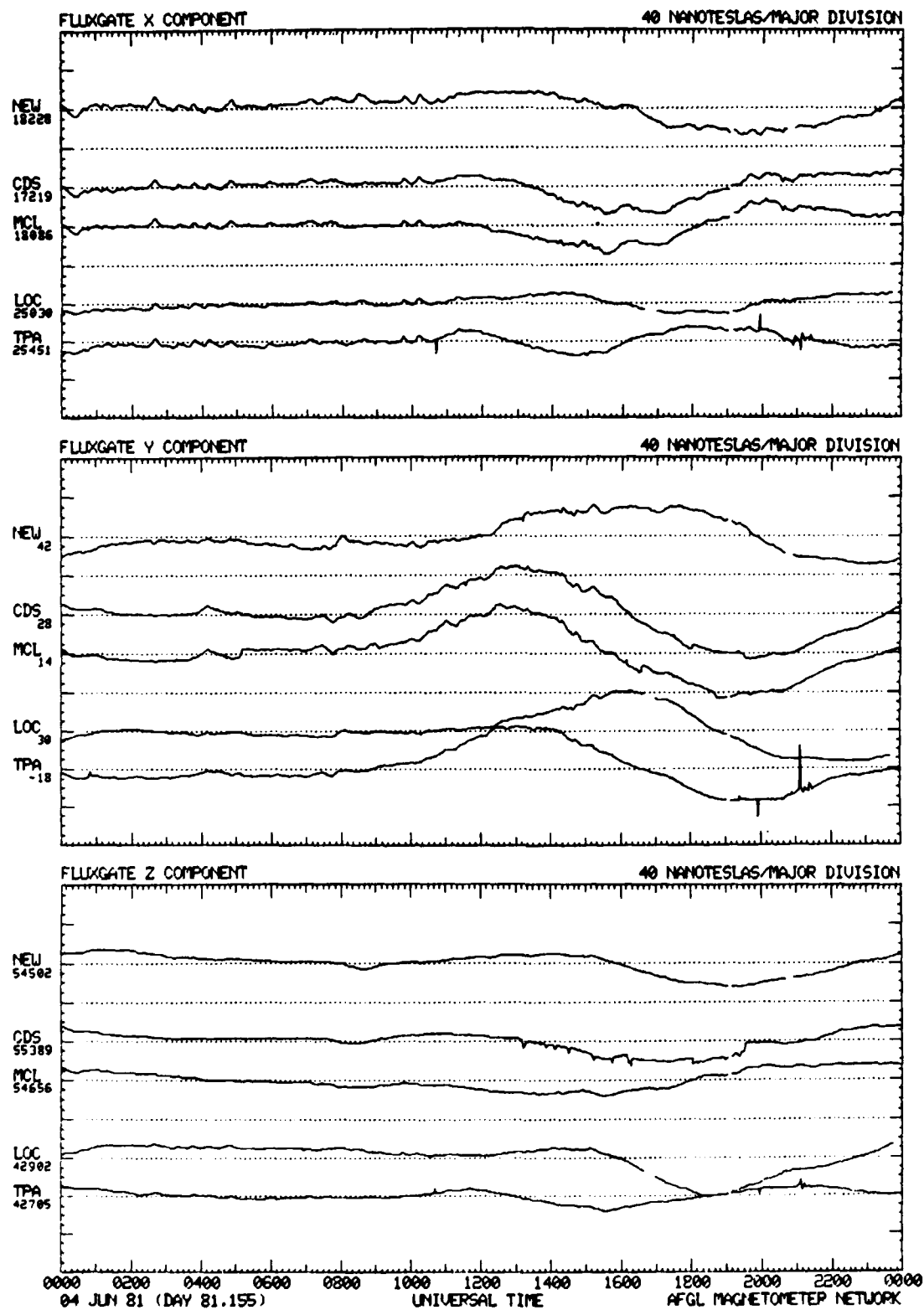


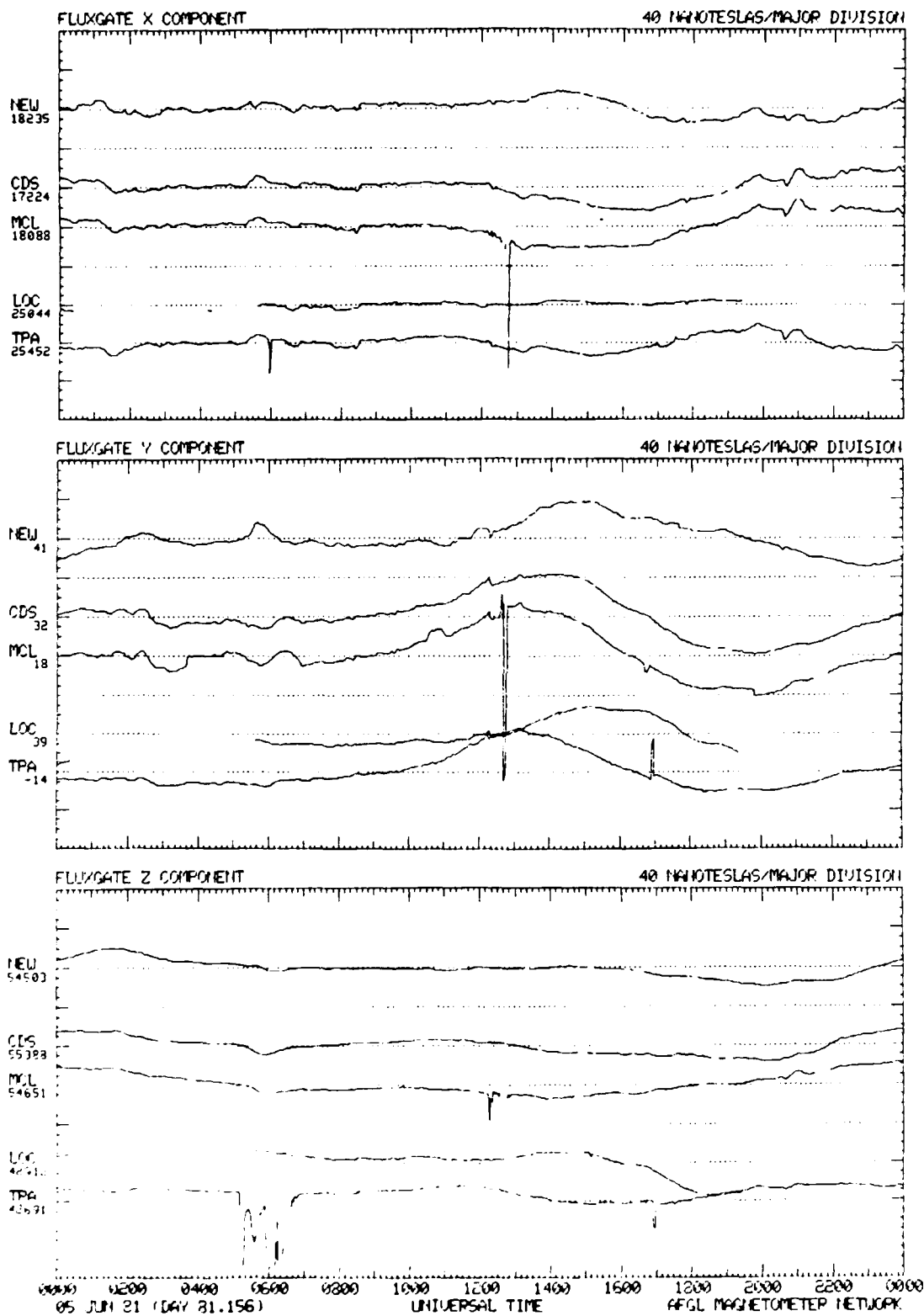




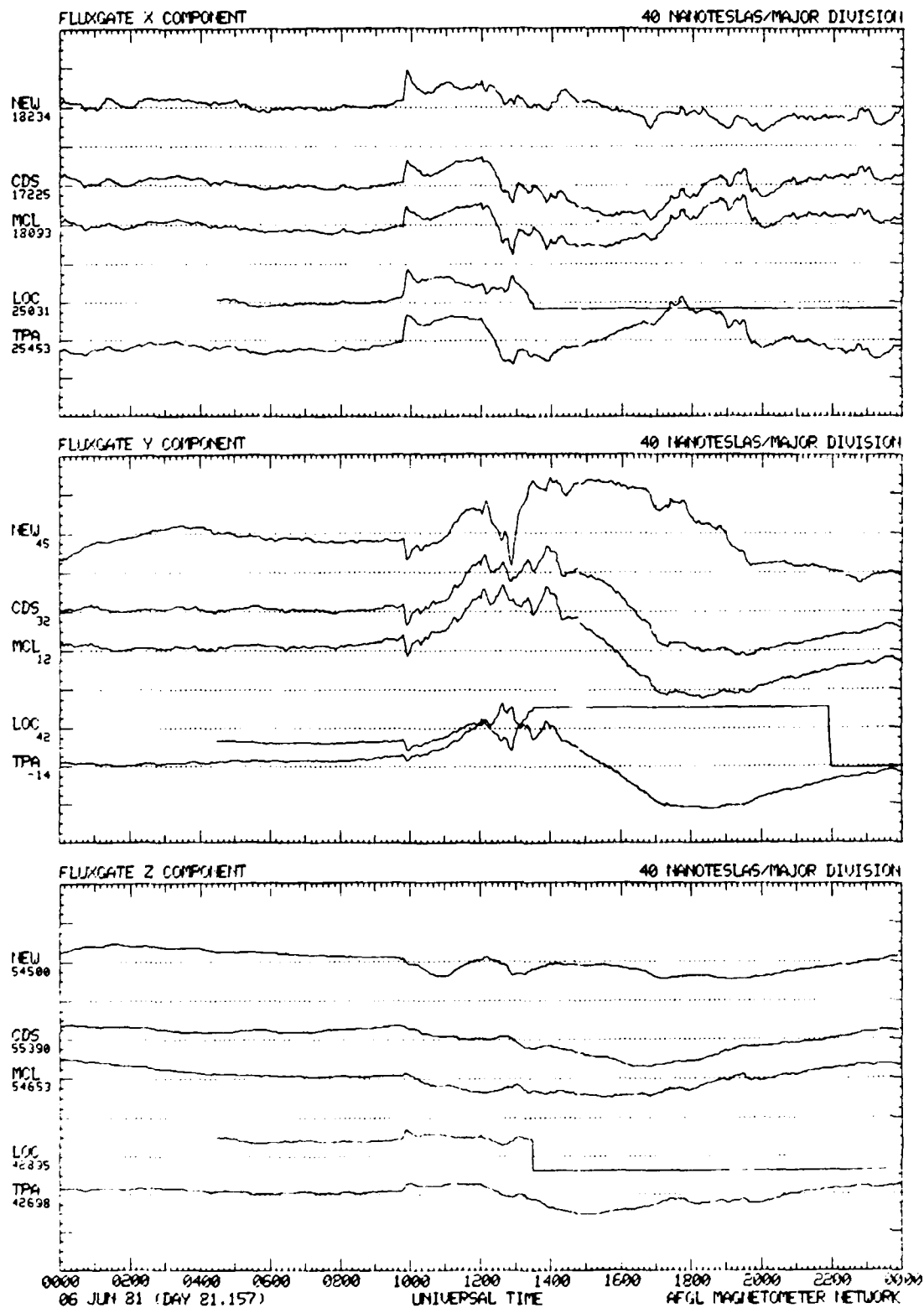


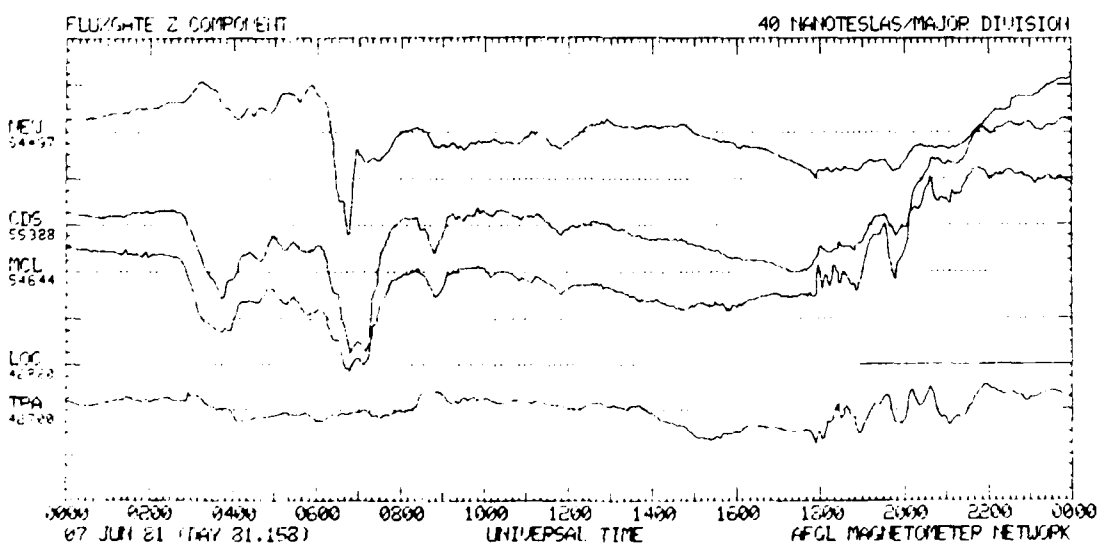
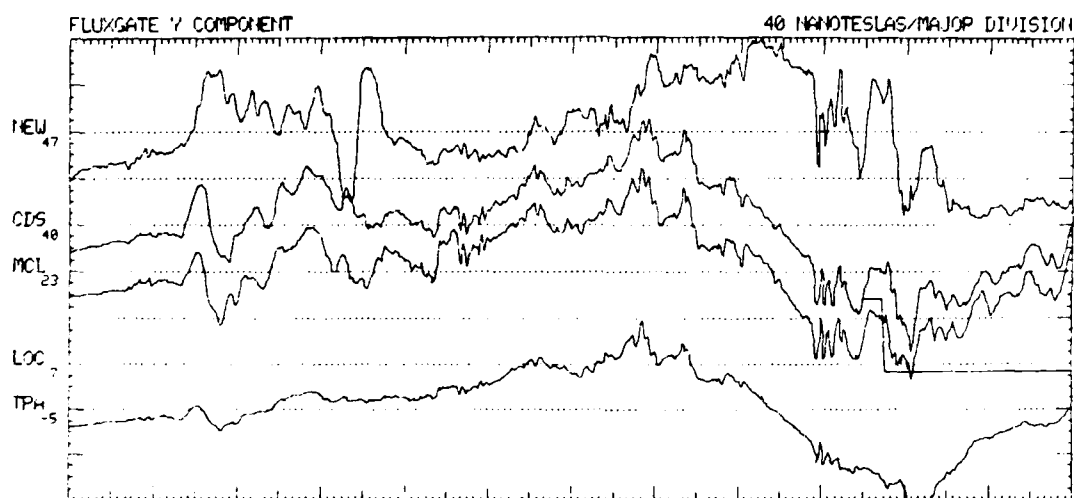
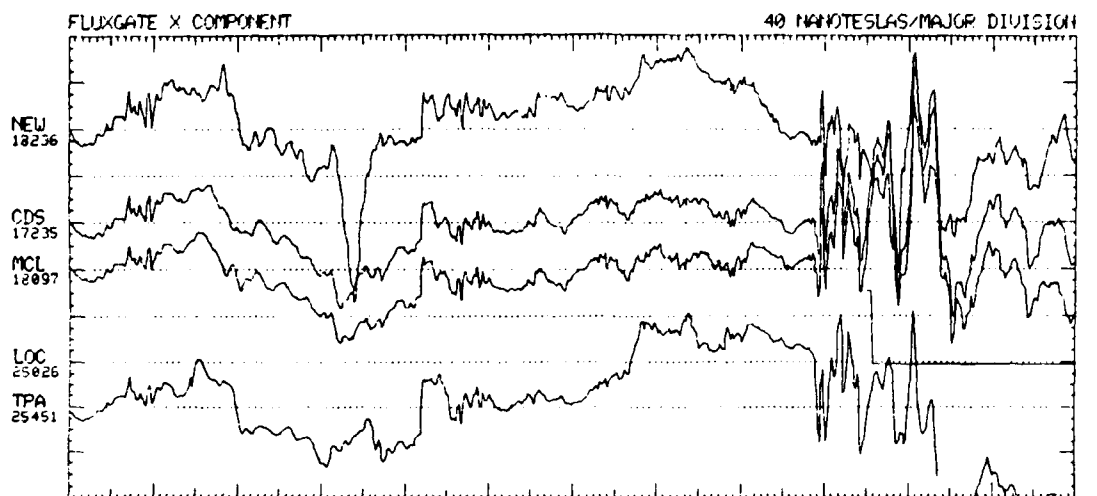


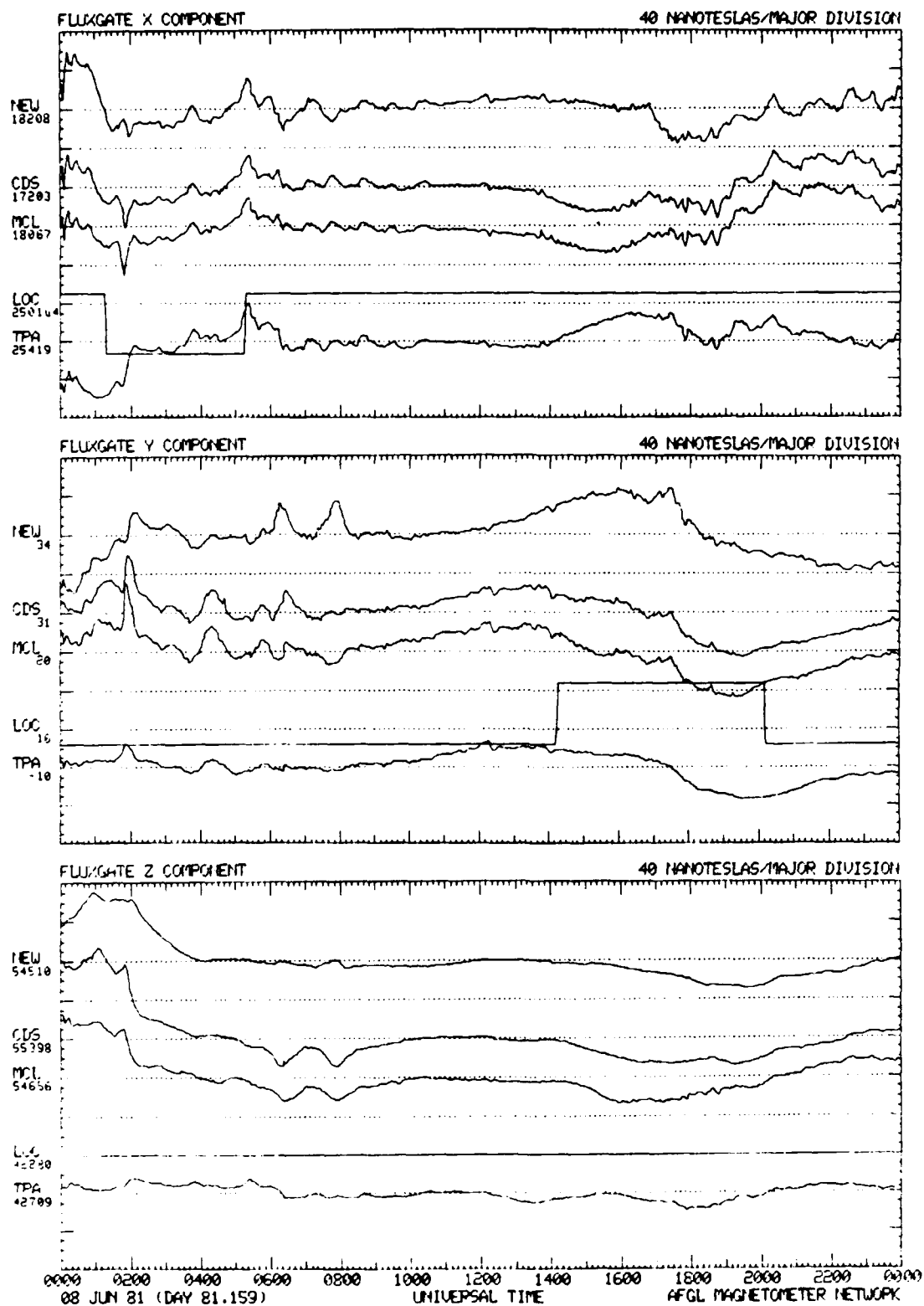


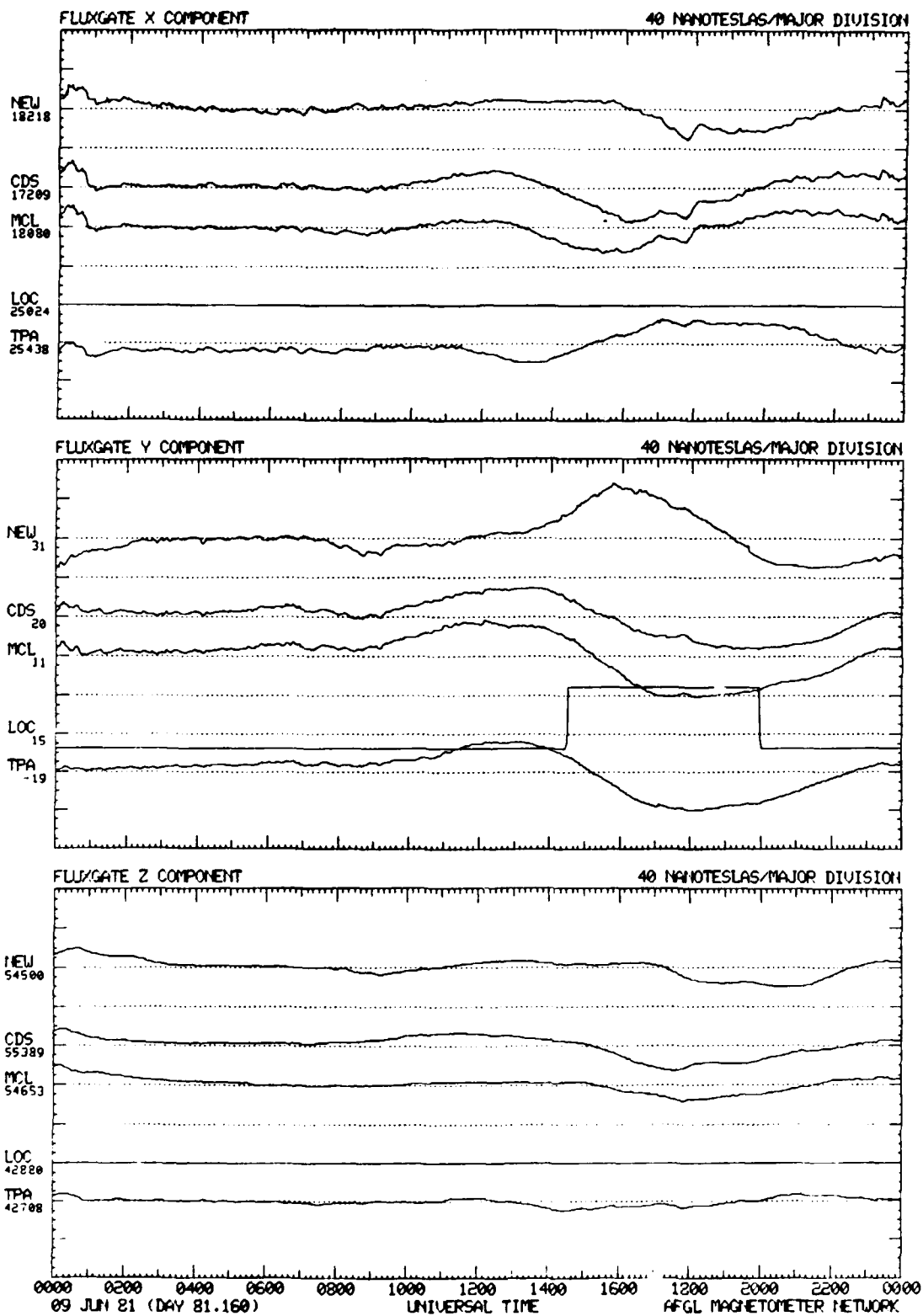


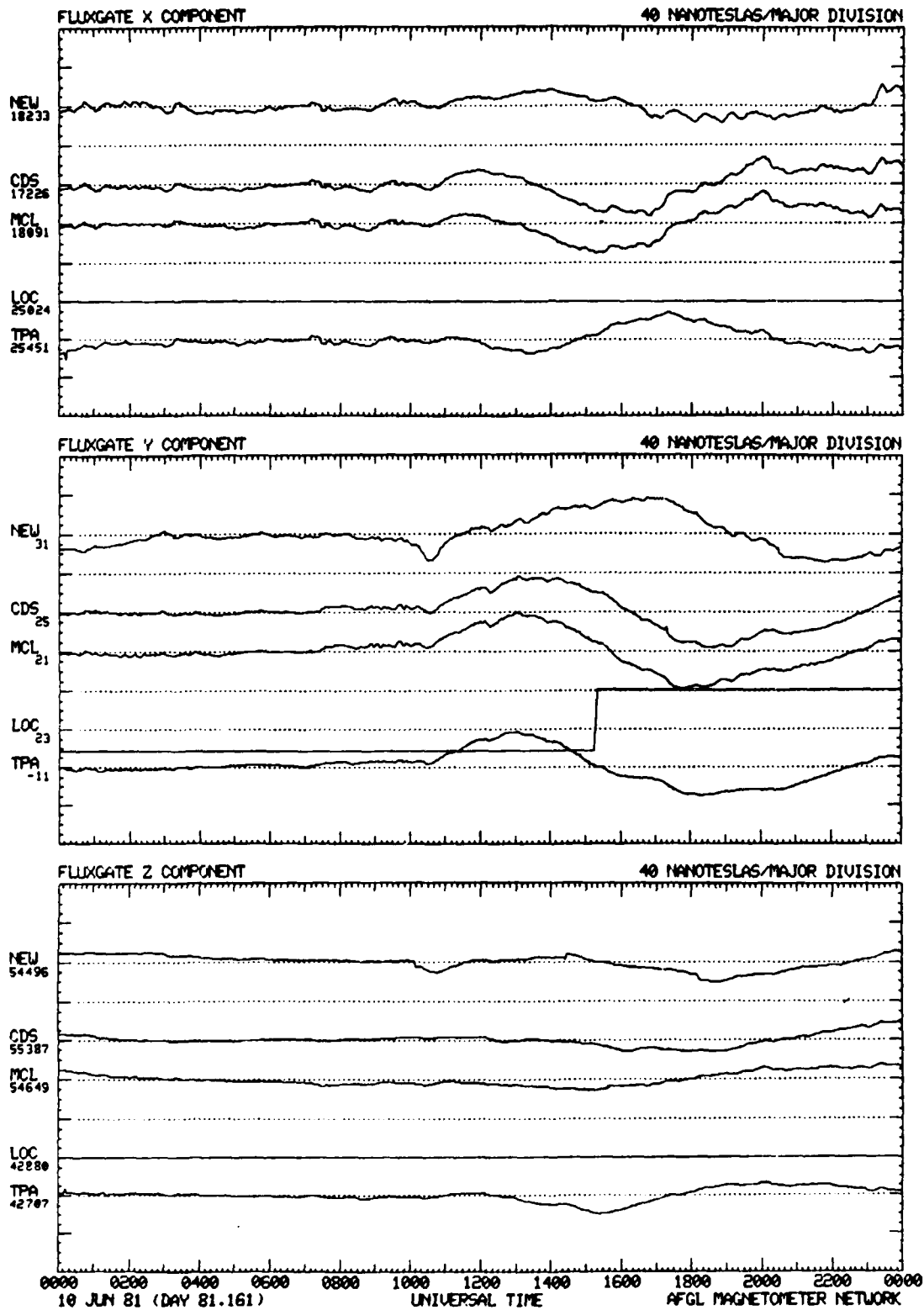


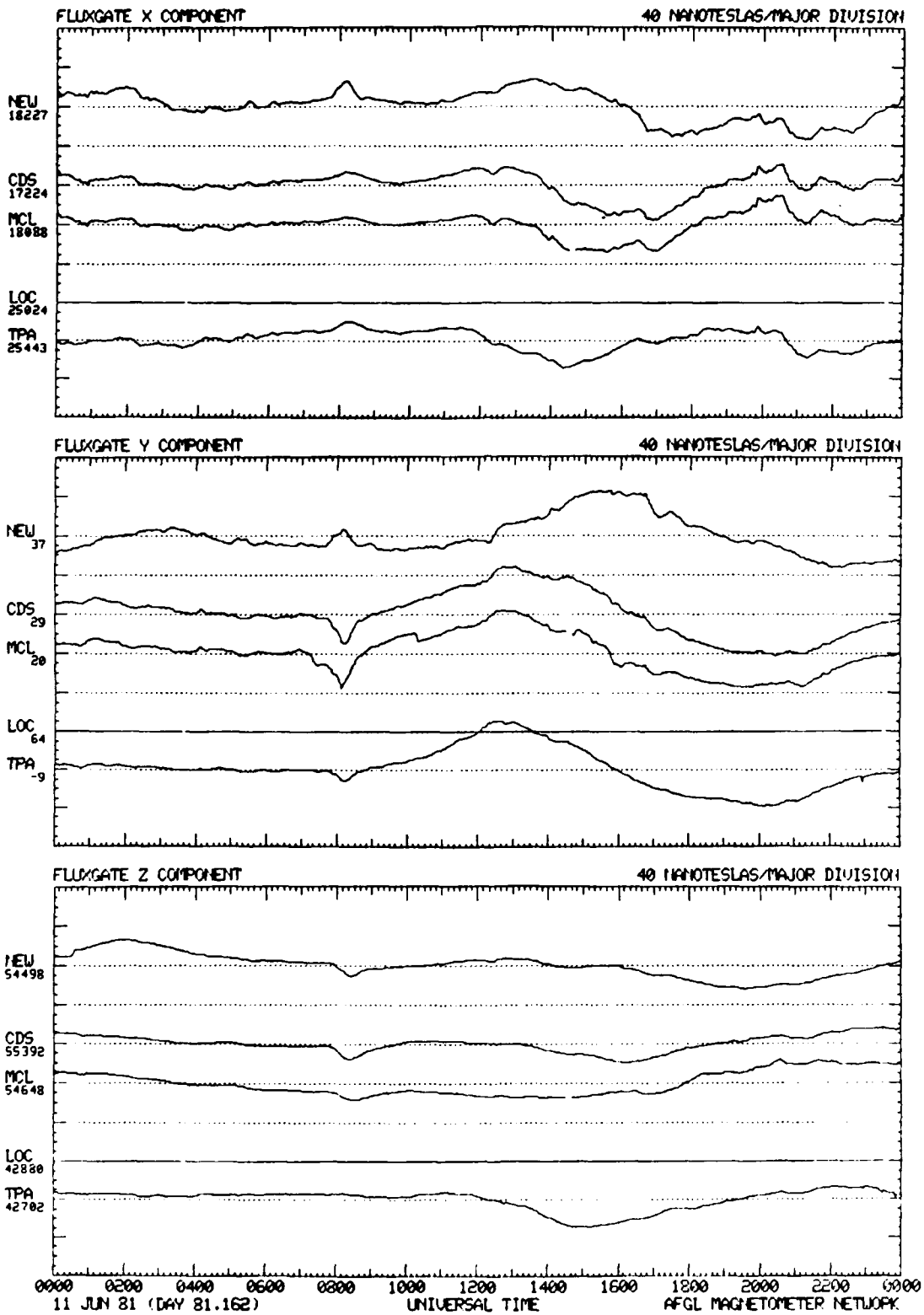


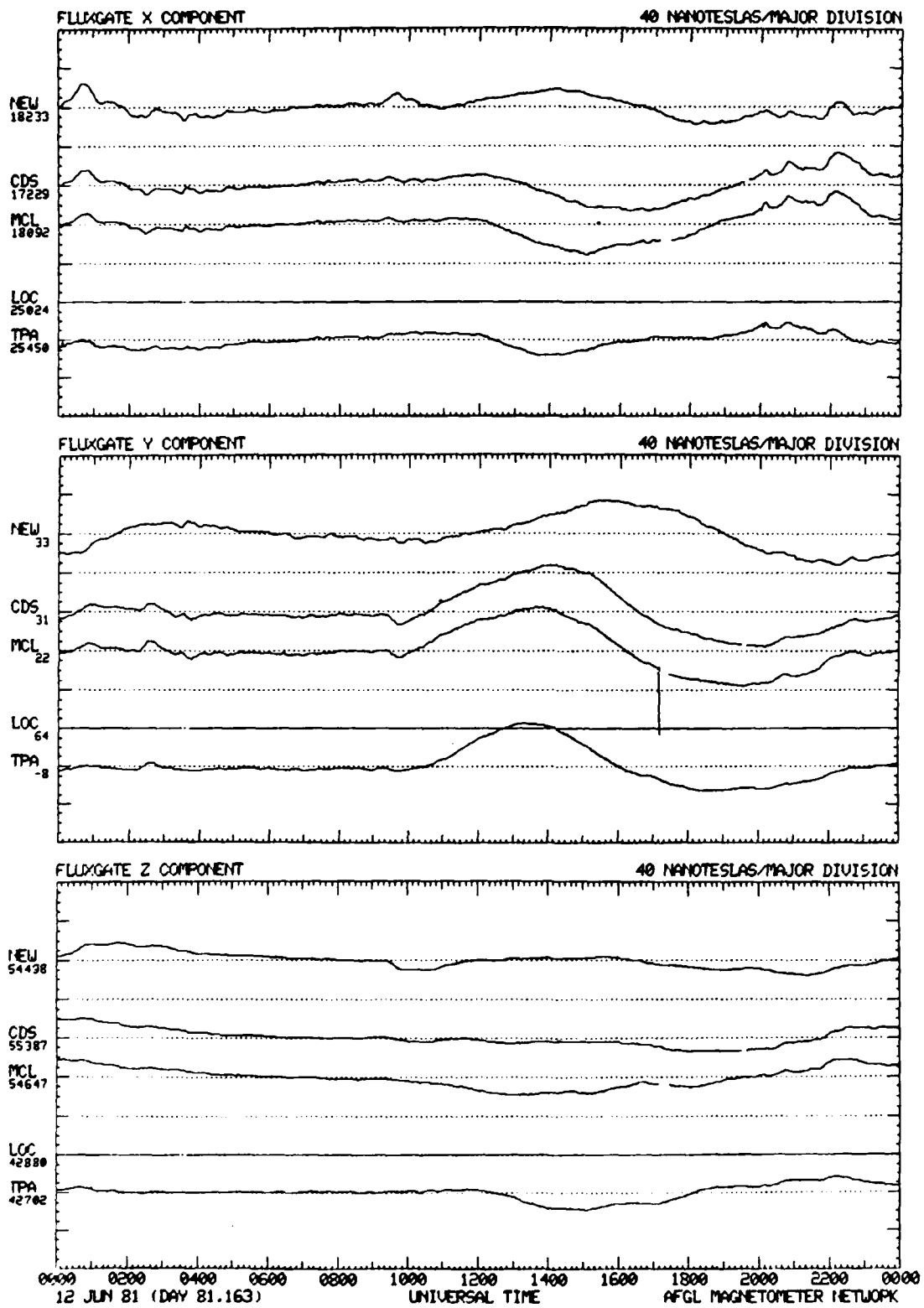


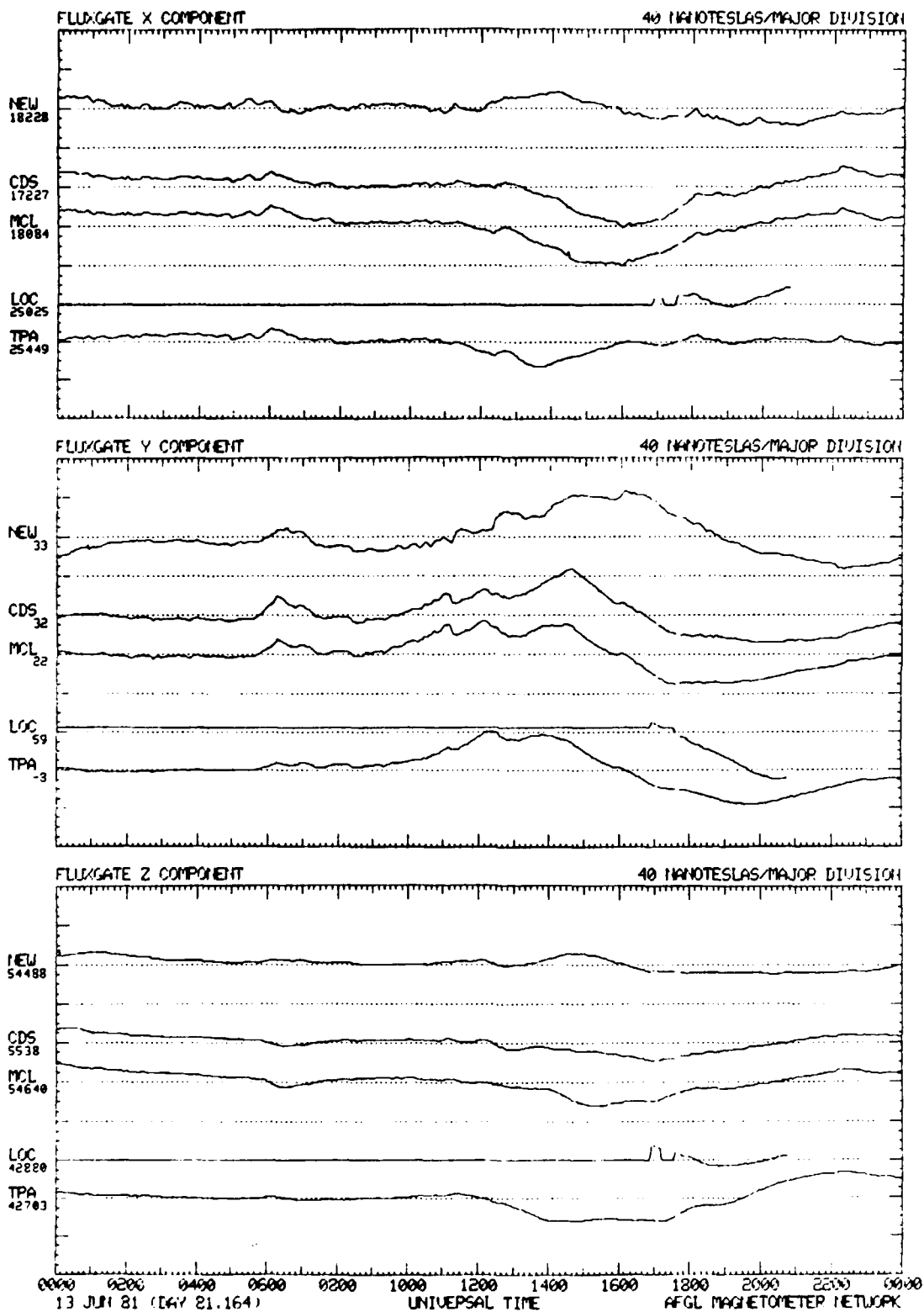




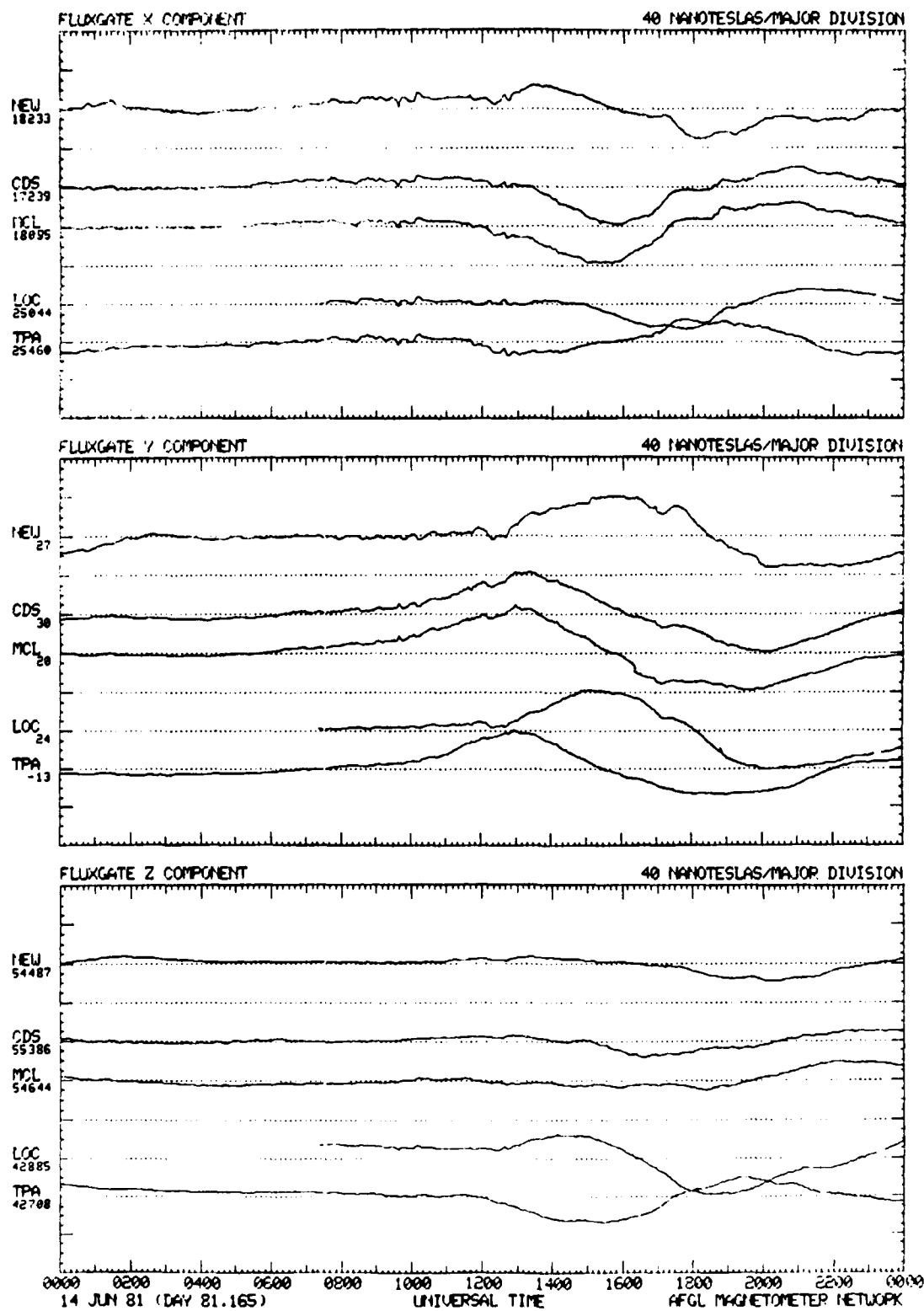


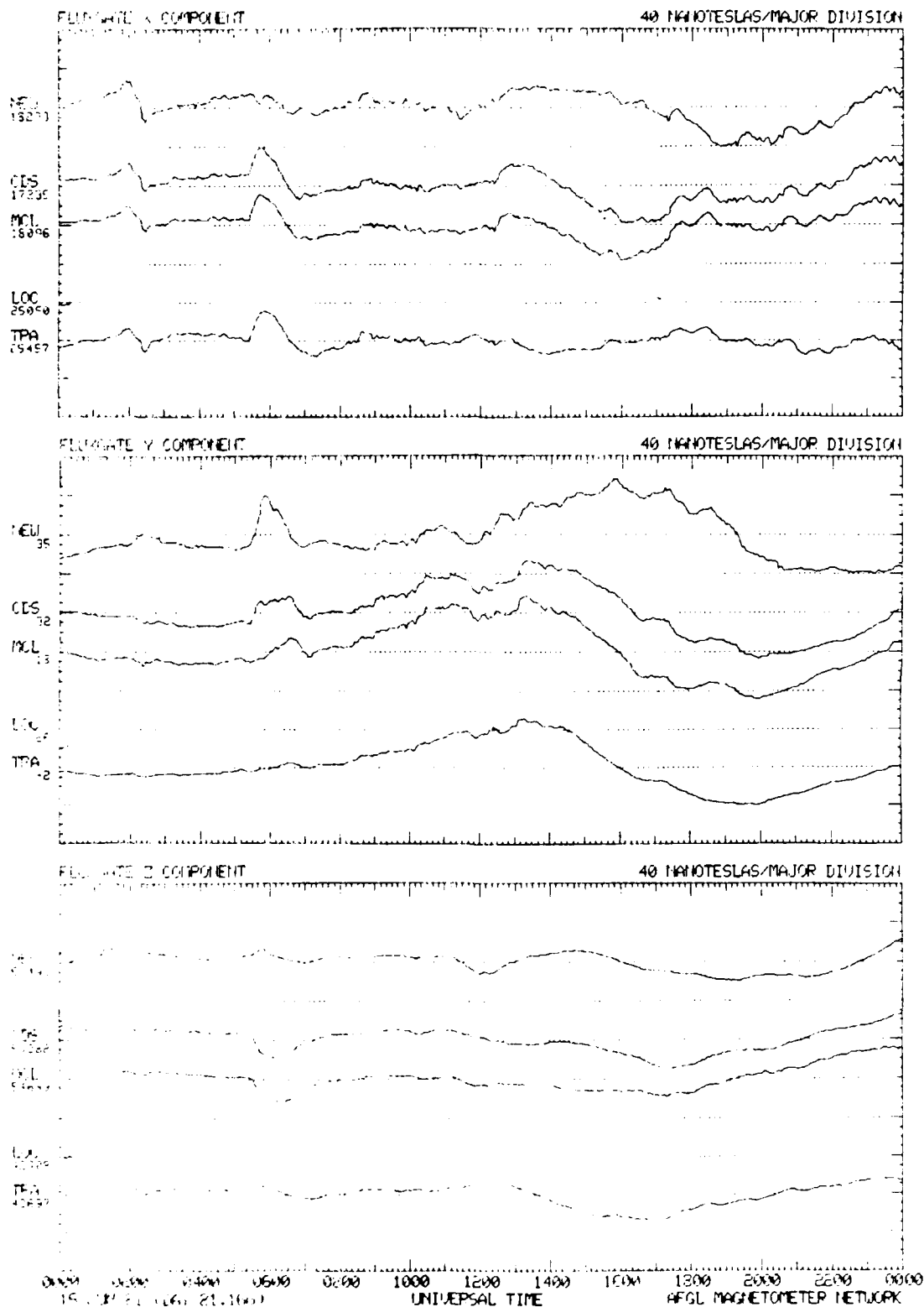






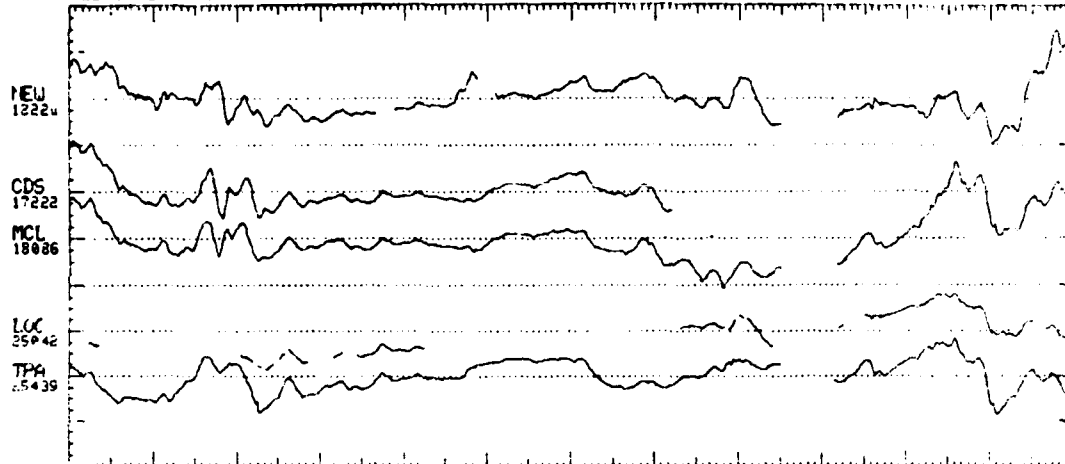






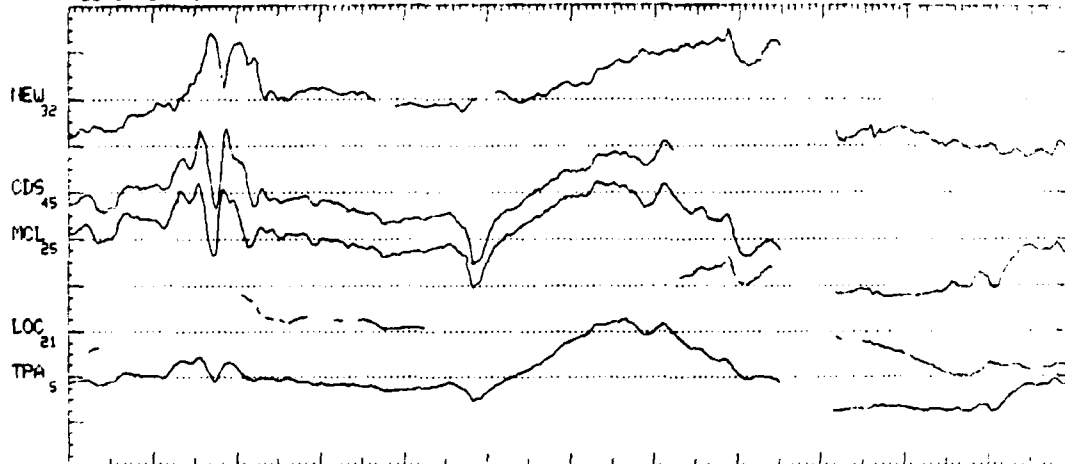
# FLUXGATE X COMPONENT

40 NANOTESLAS/MAJOR DIVISION



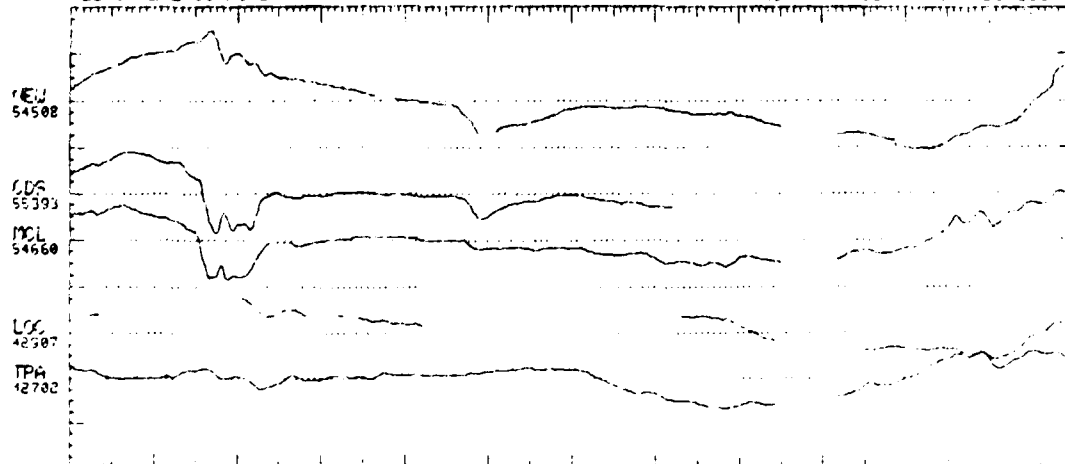
# FLUXGATE Y COMPONENT

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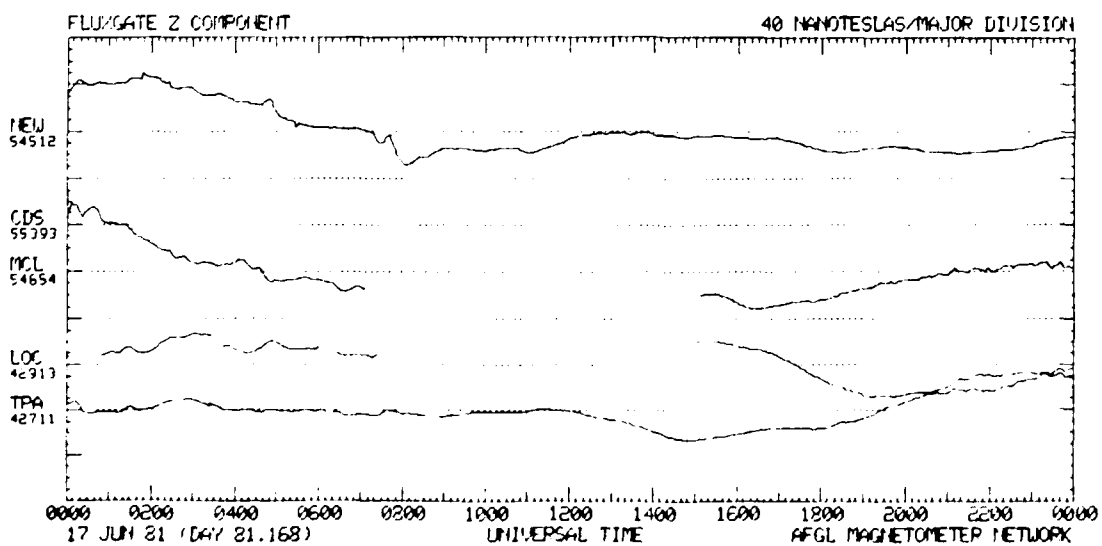
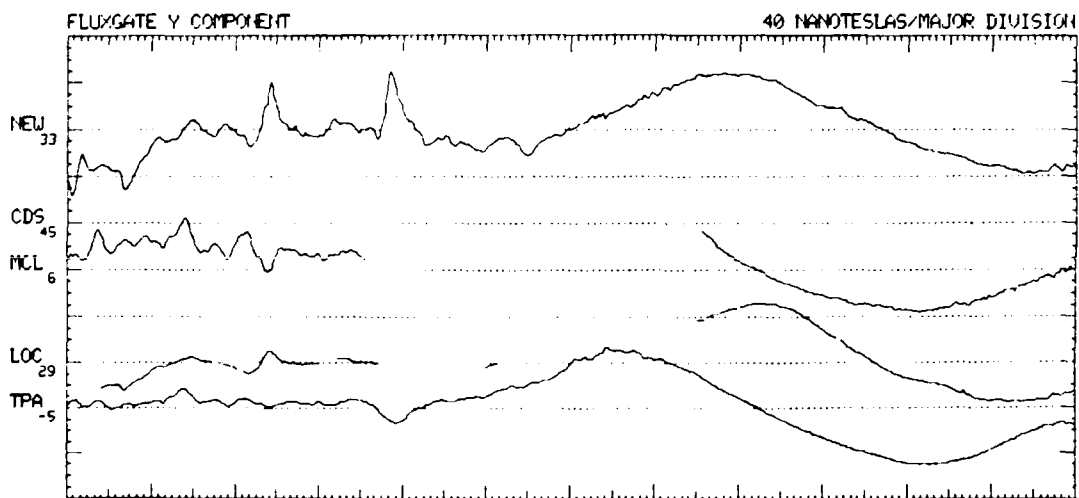
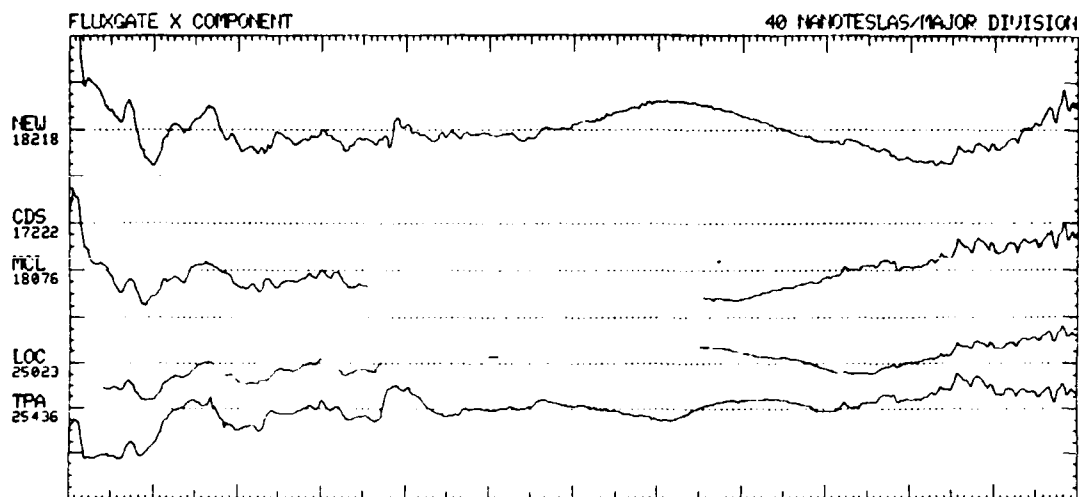


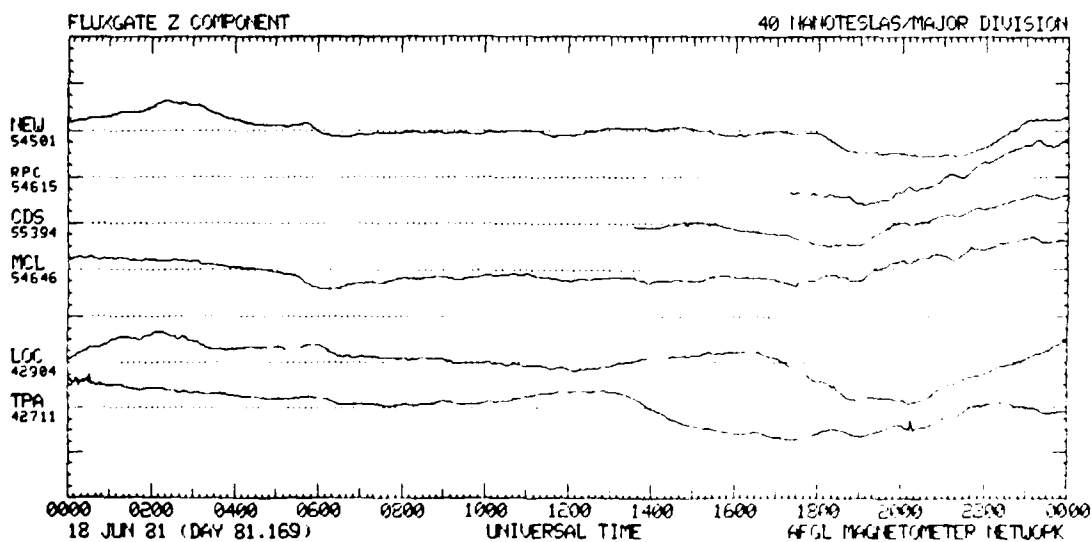
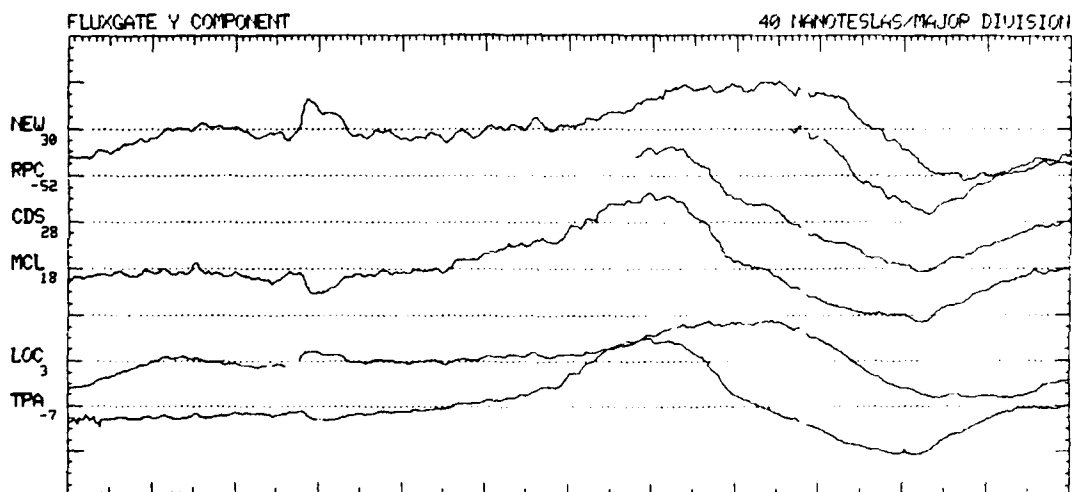
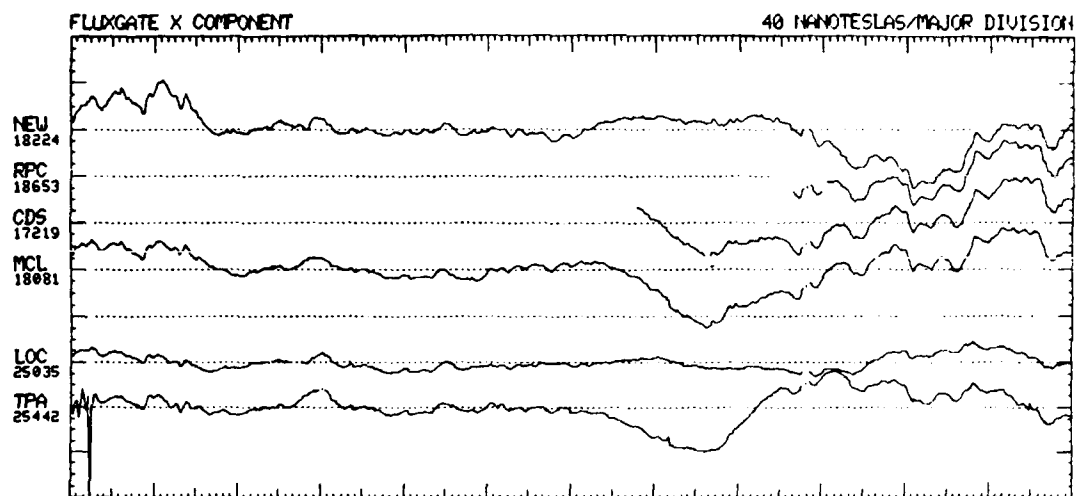
# FLUXGATE Z COMPONENT

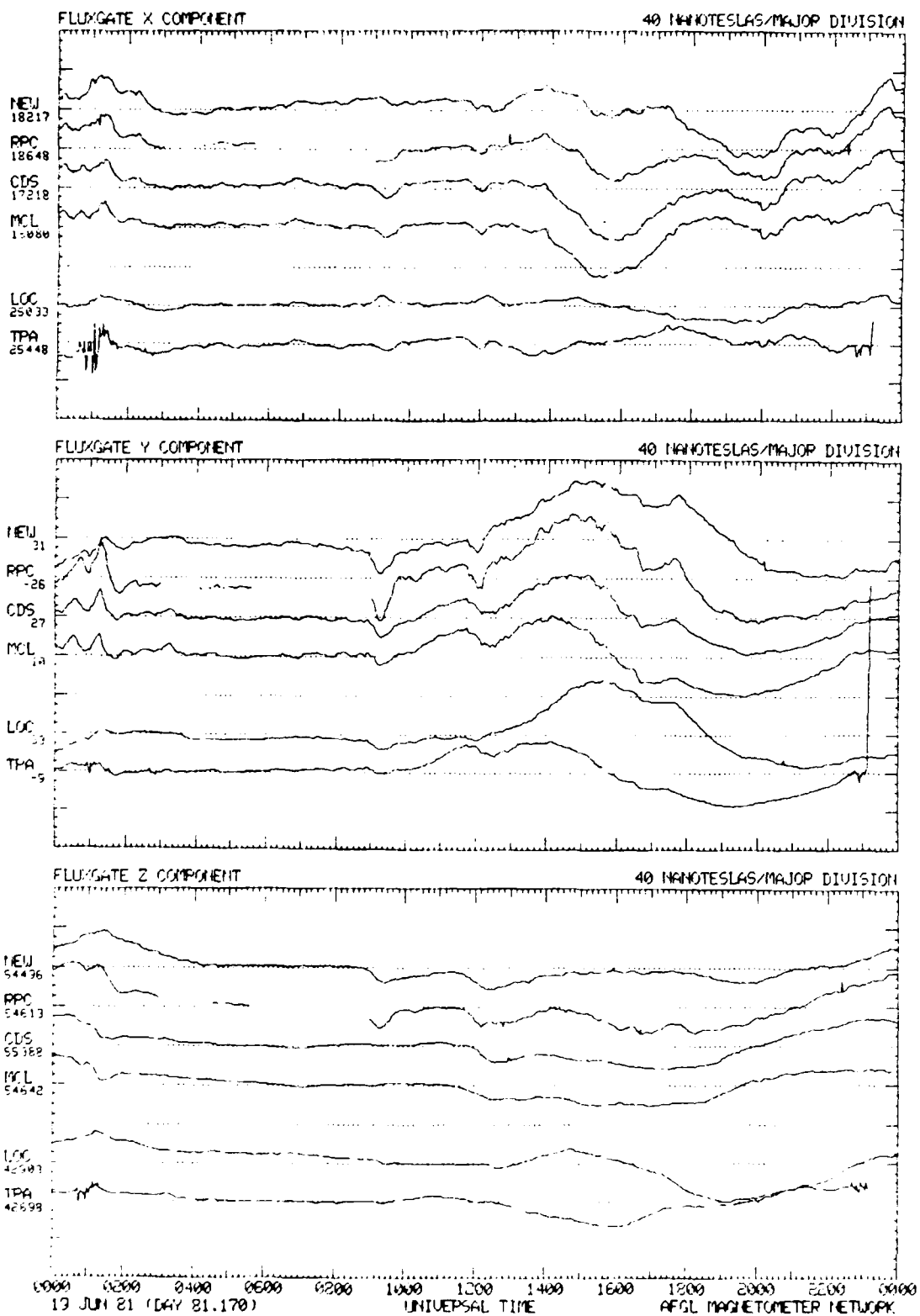
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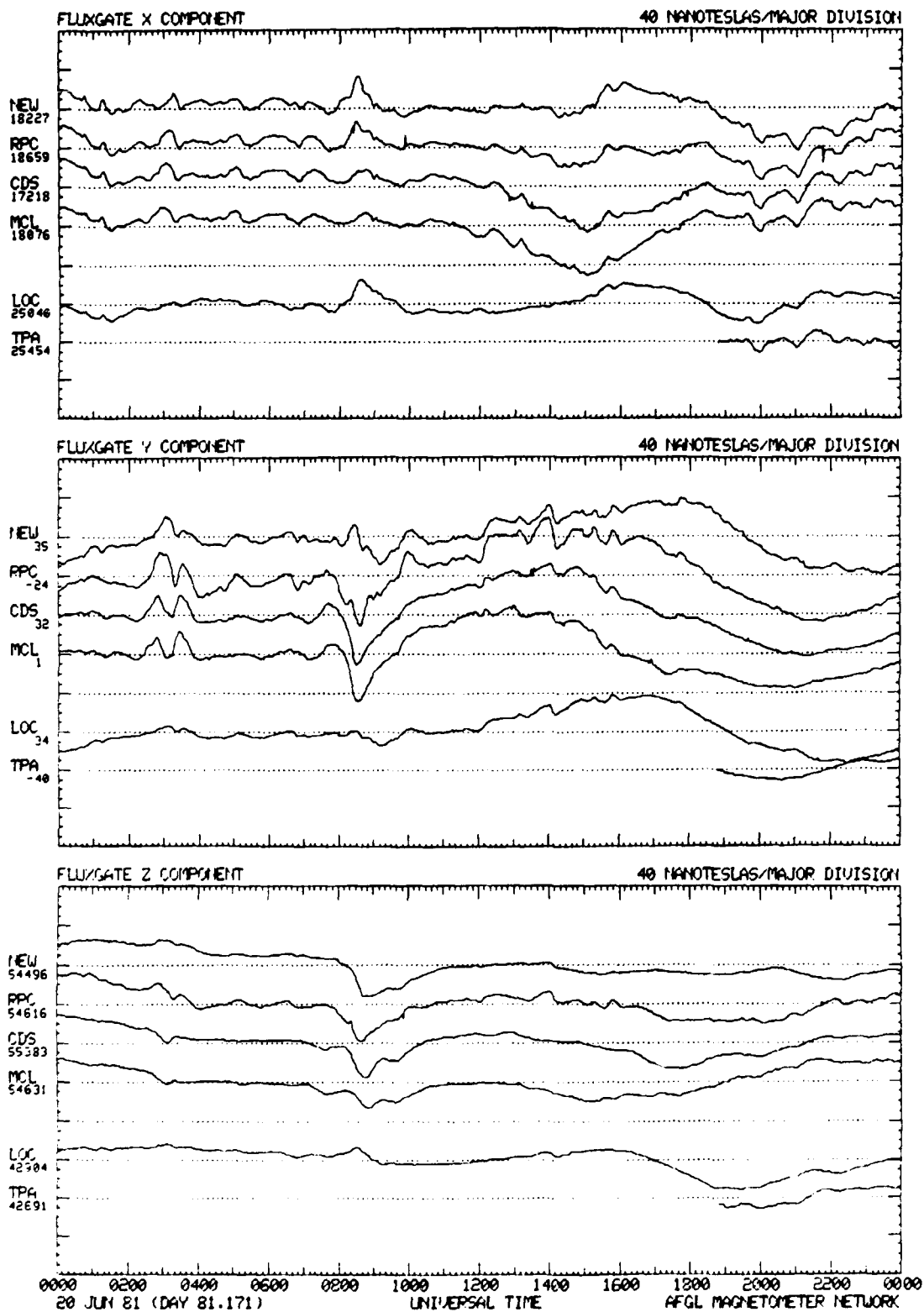


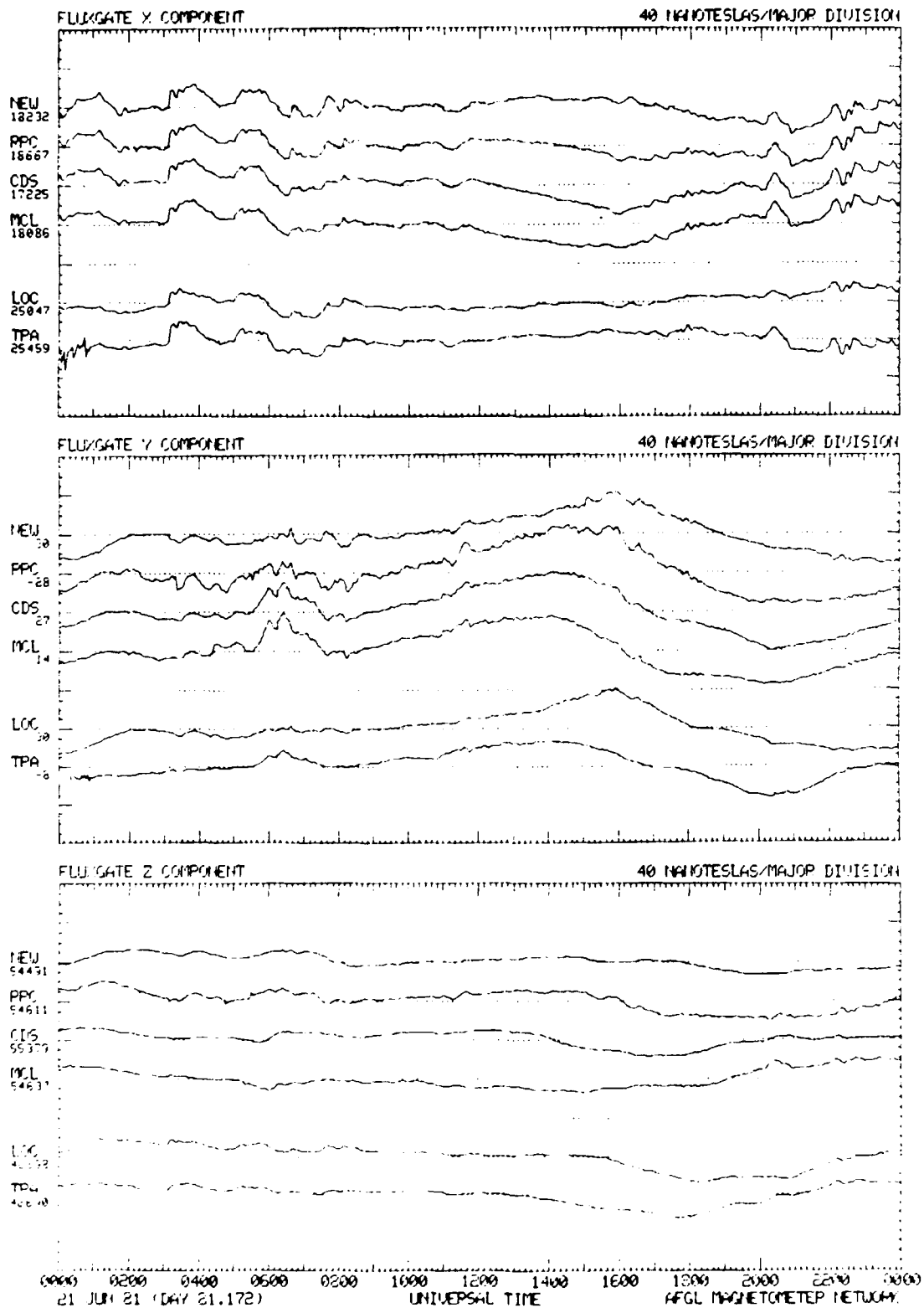
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16 JUN 81 (DAY 31.167) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK



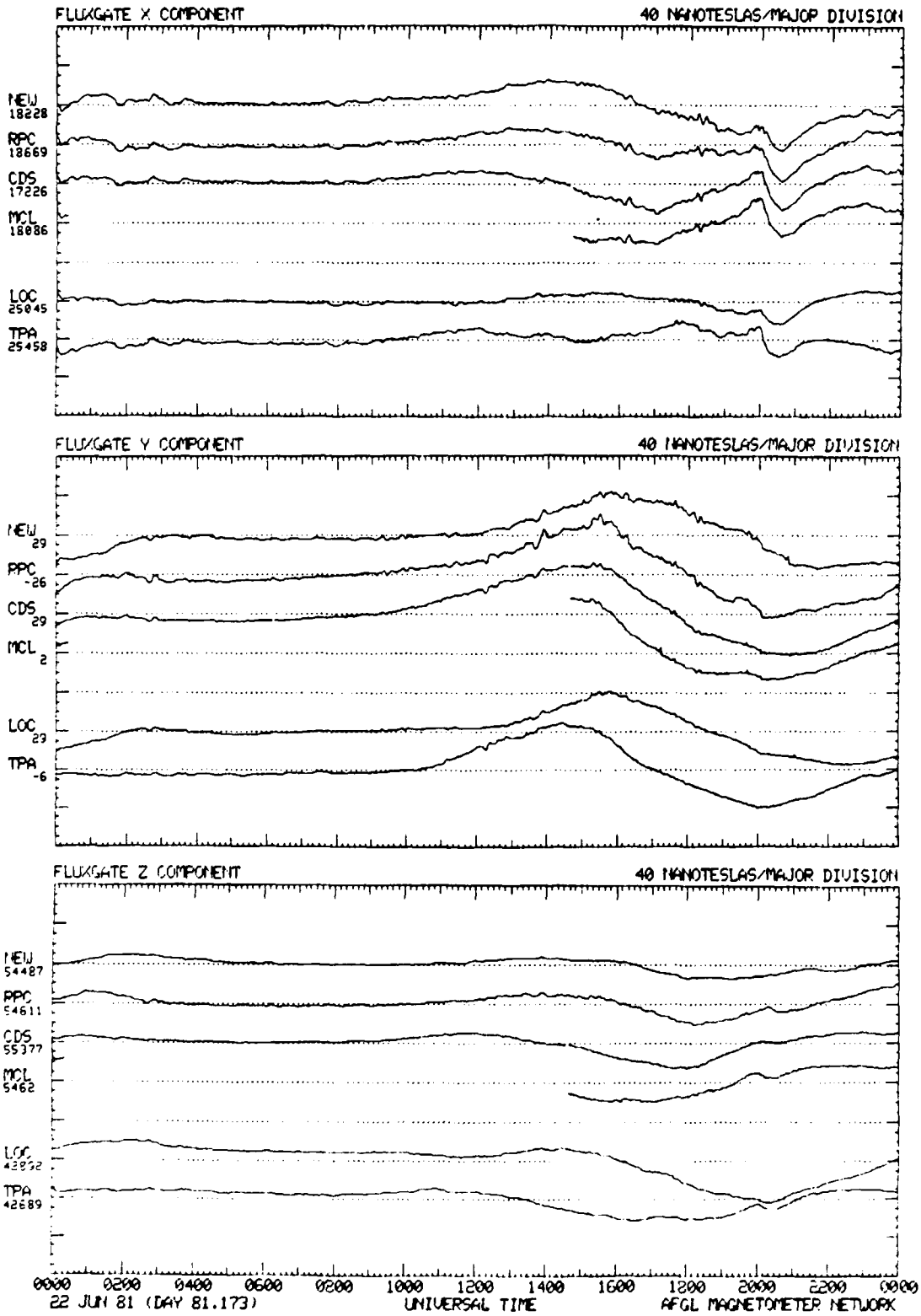


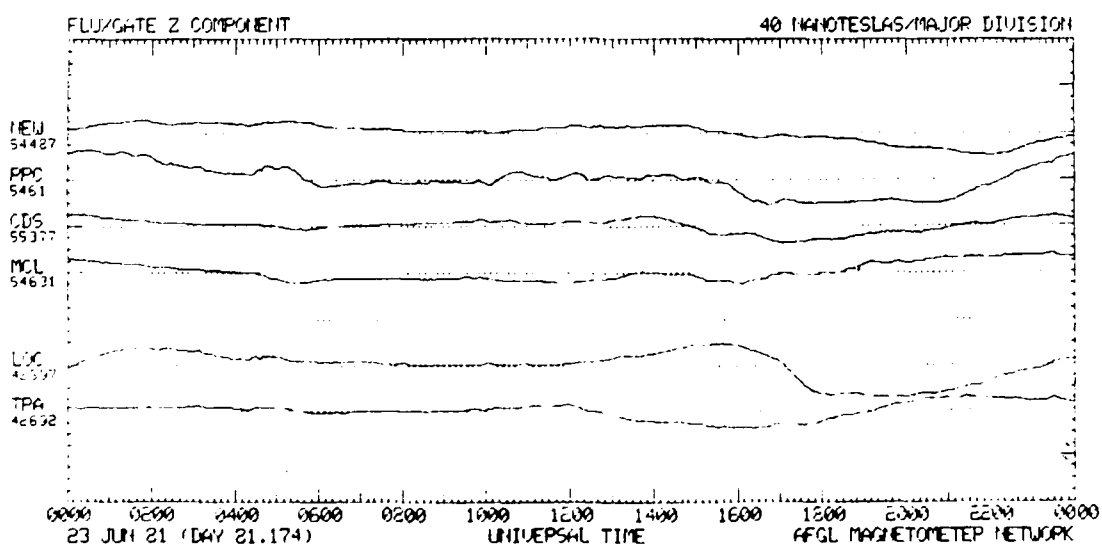
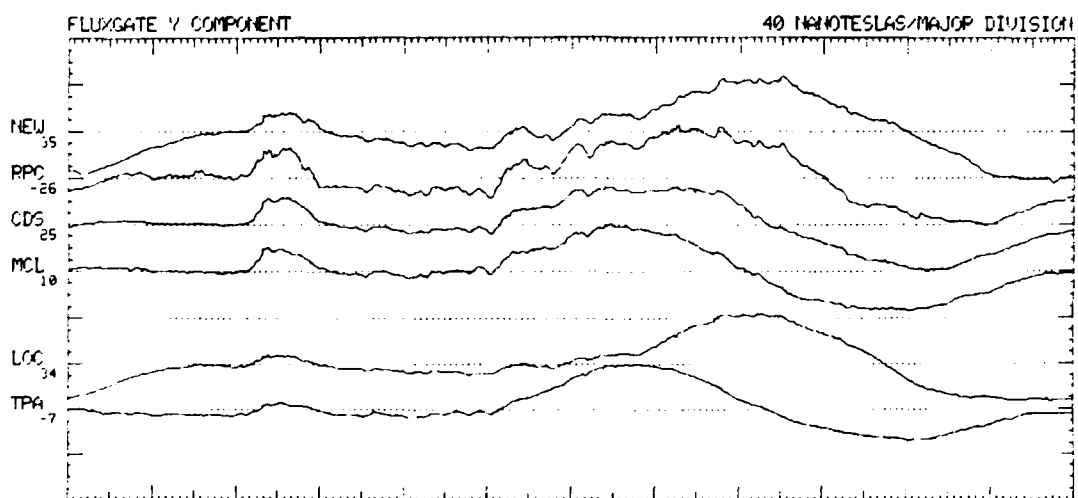
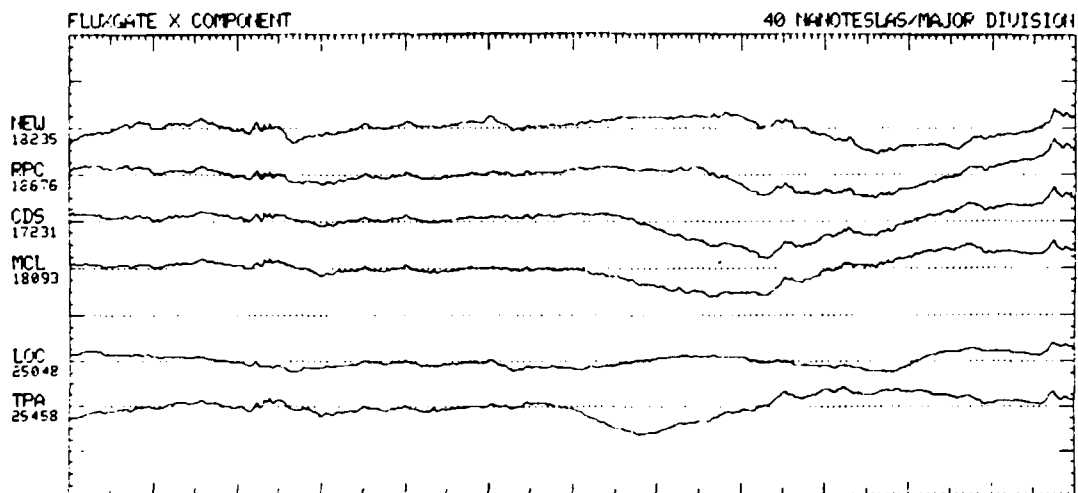


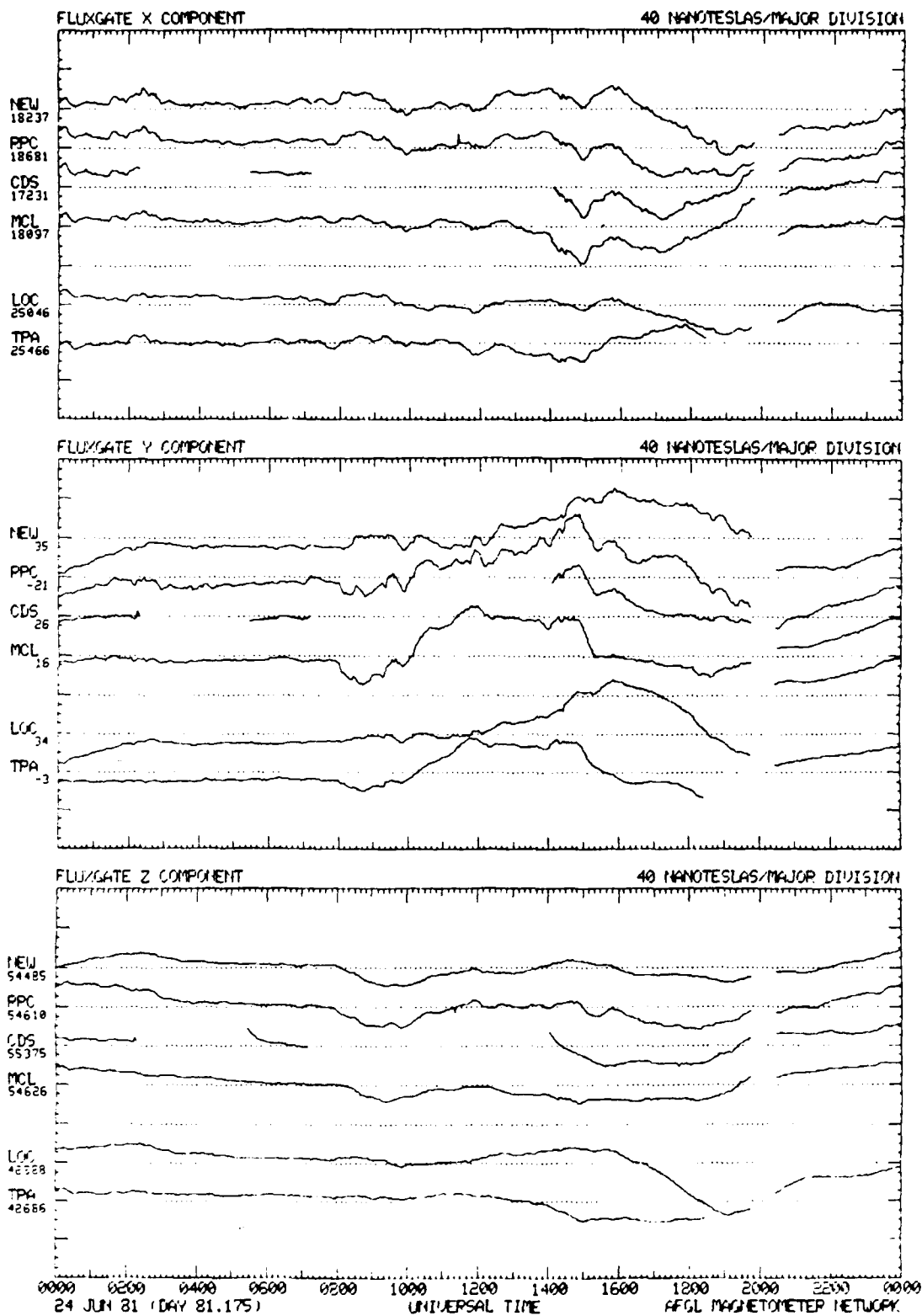


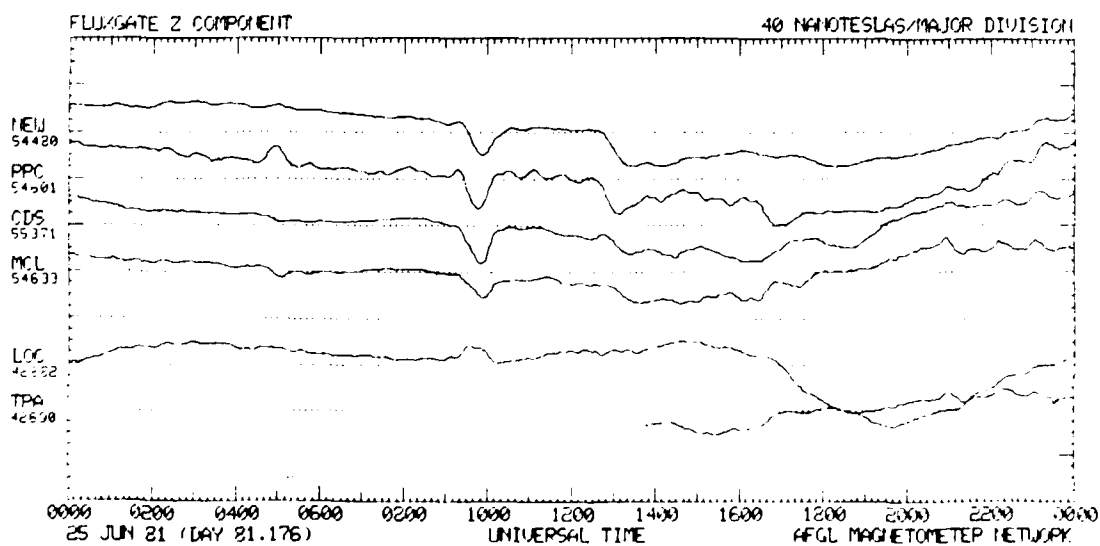
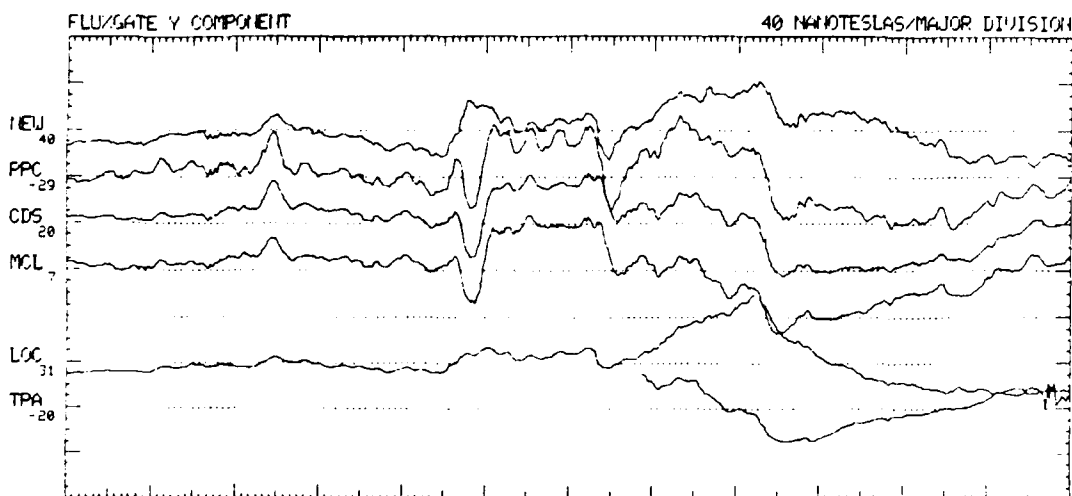
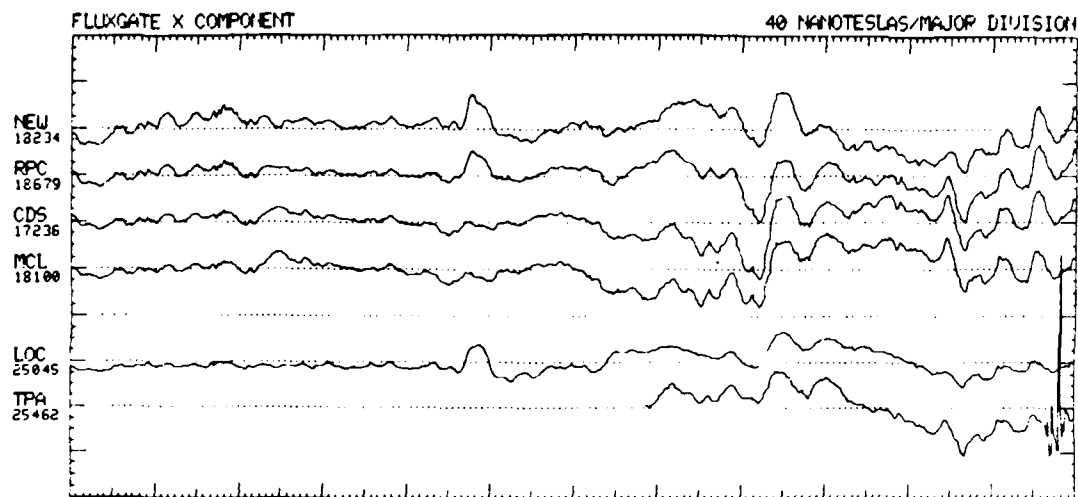


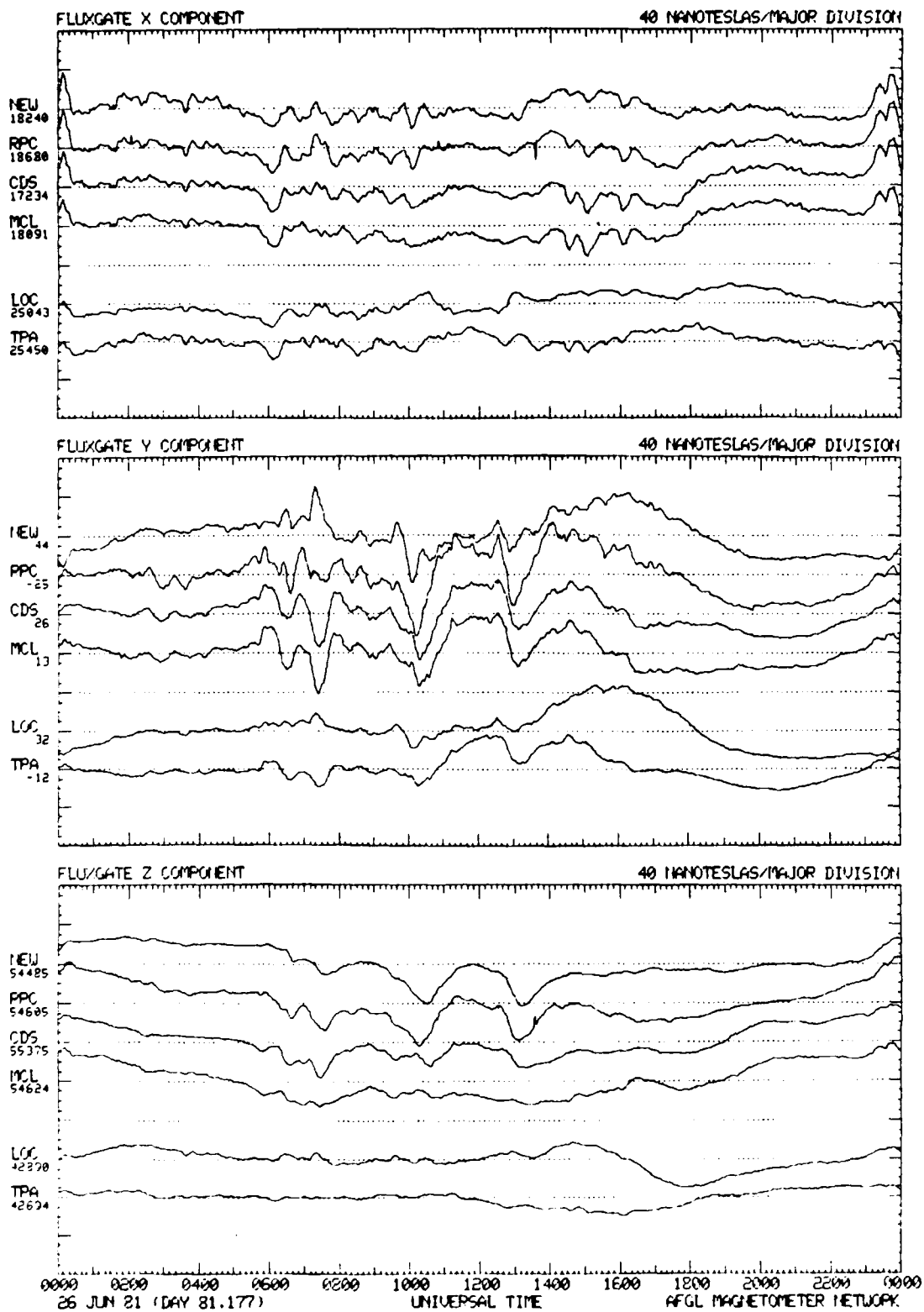


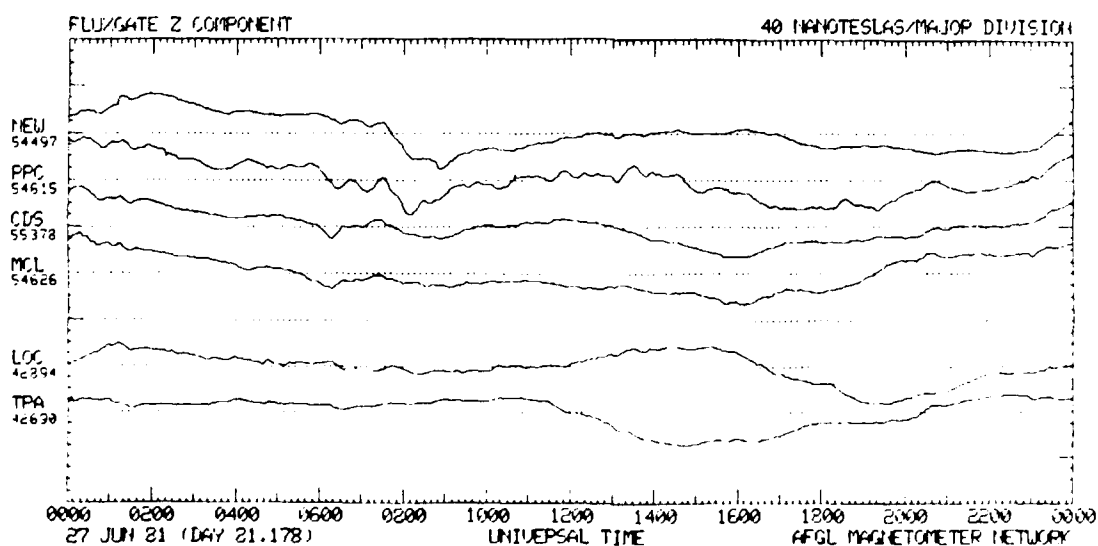
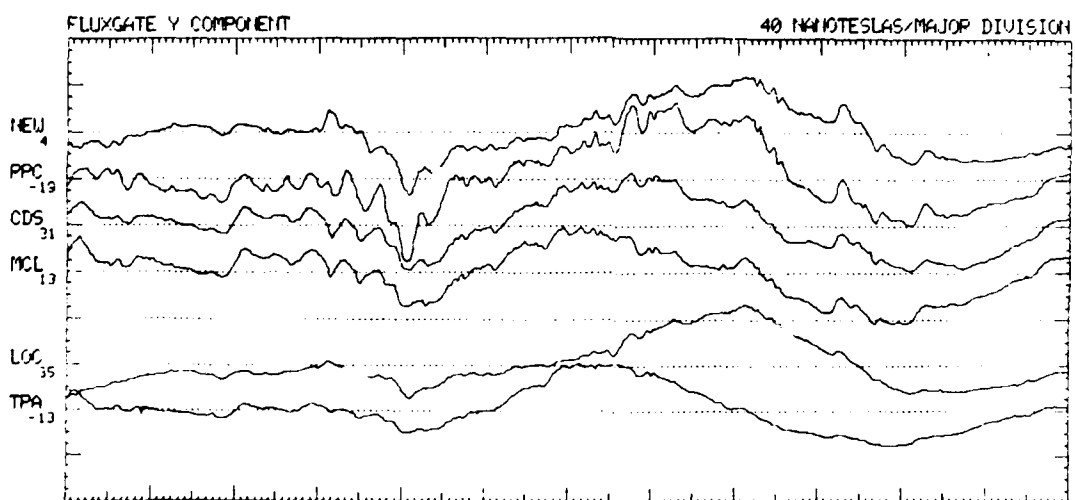
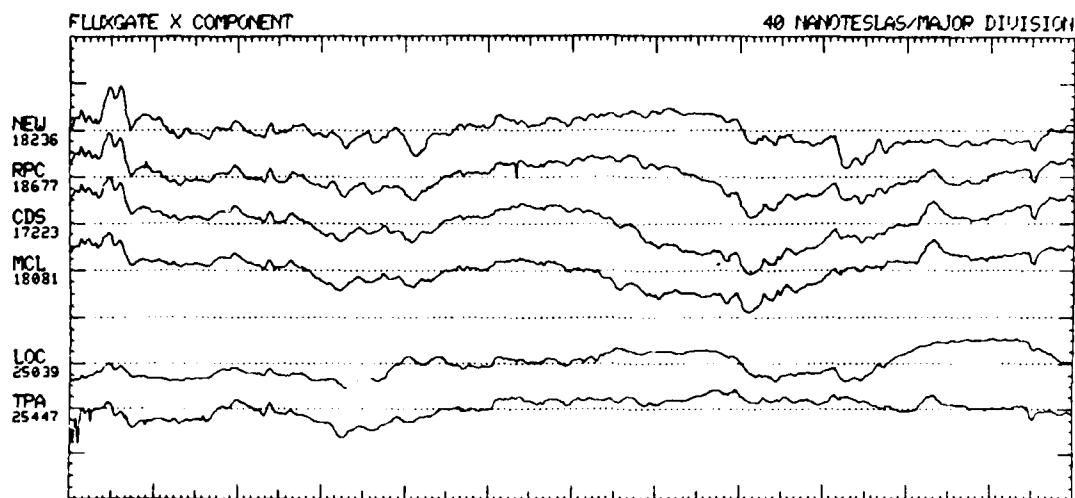


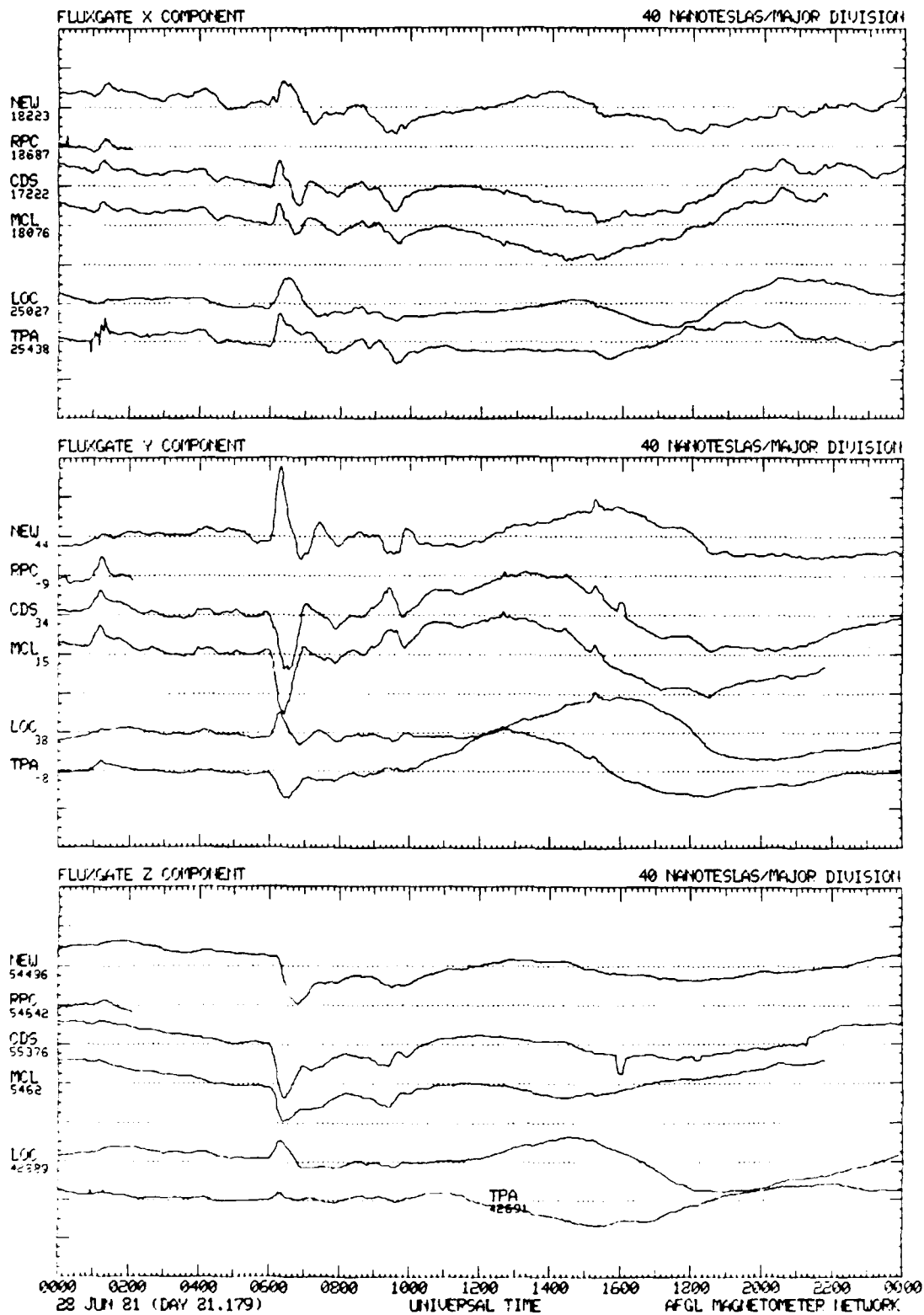


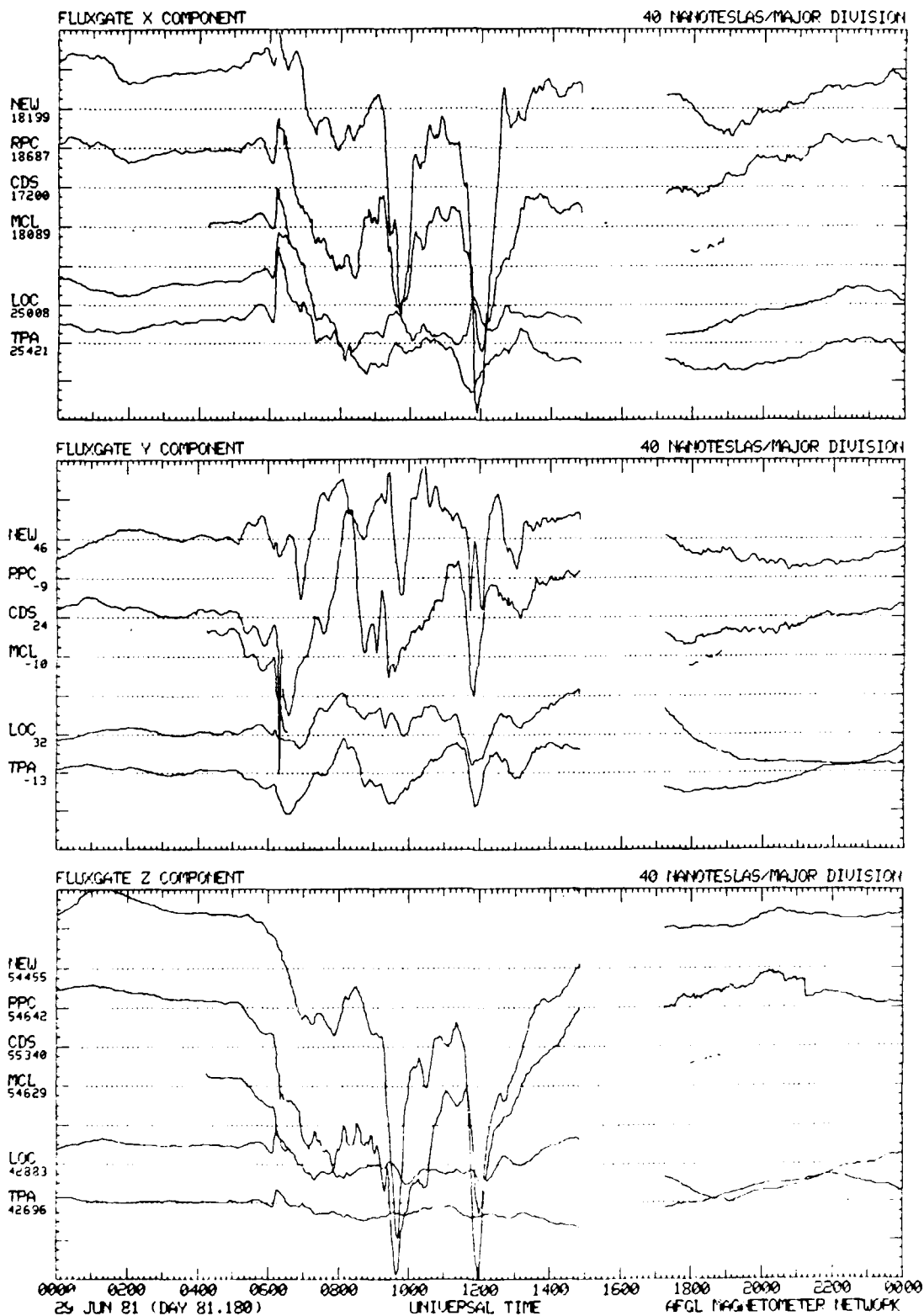








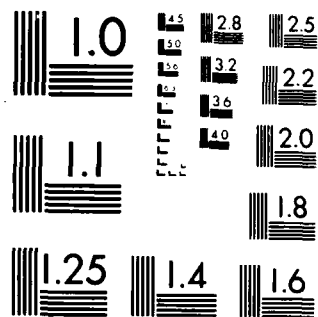




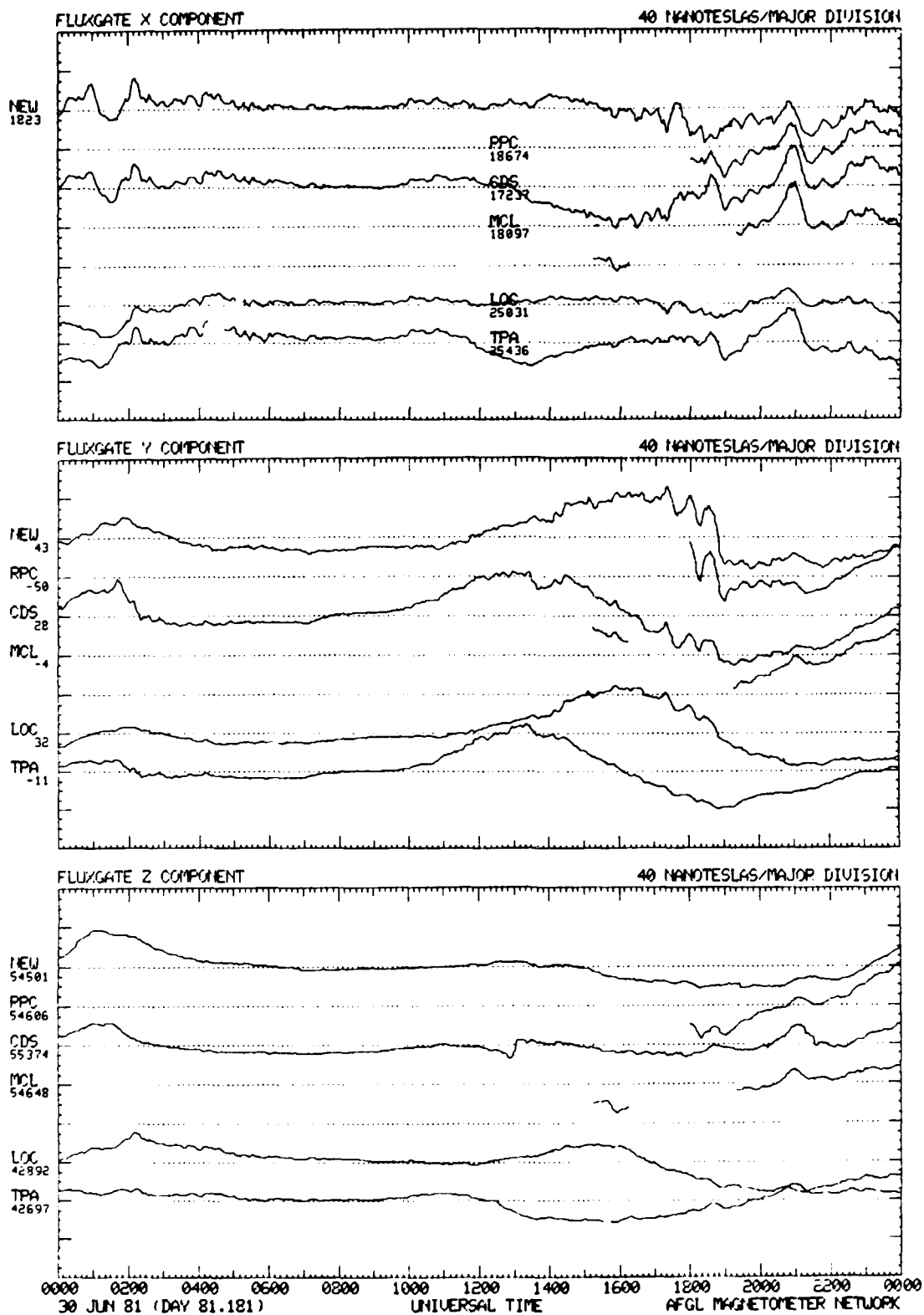


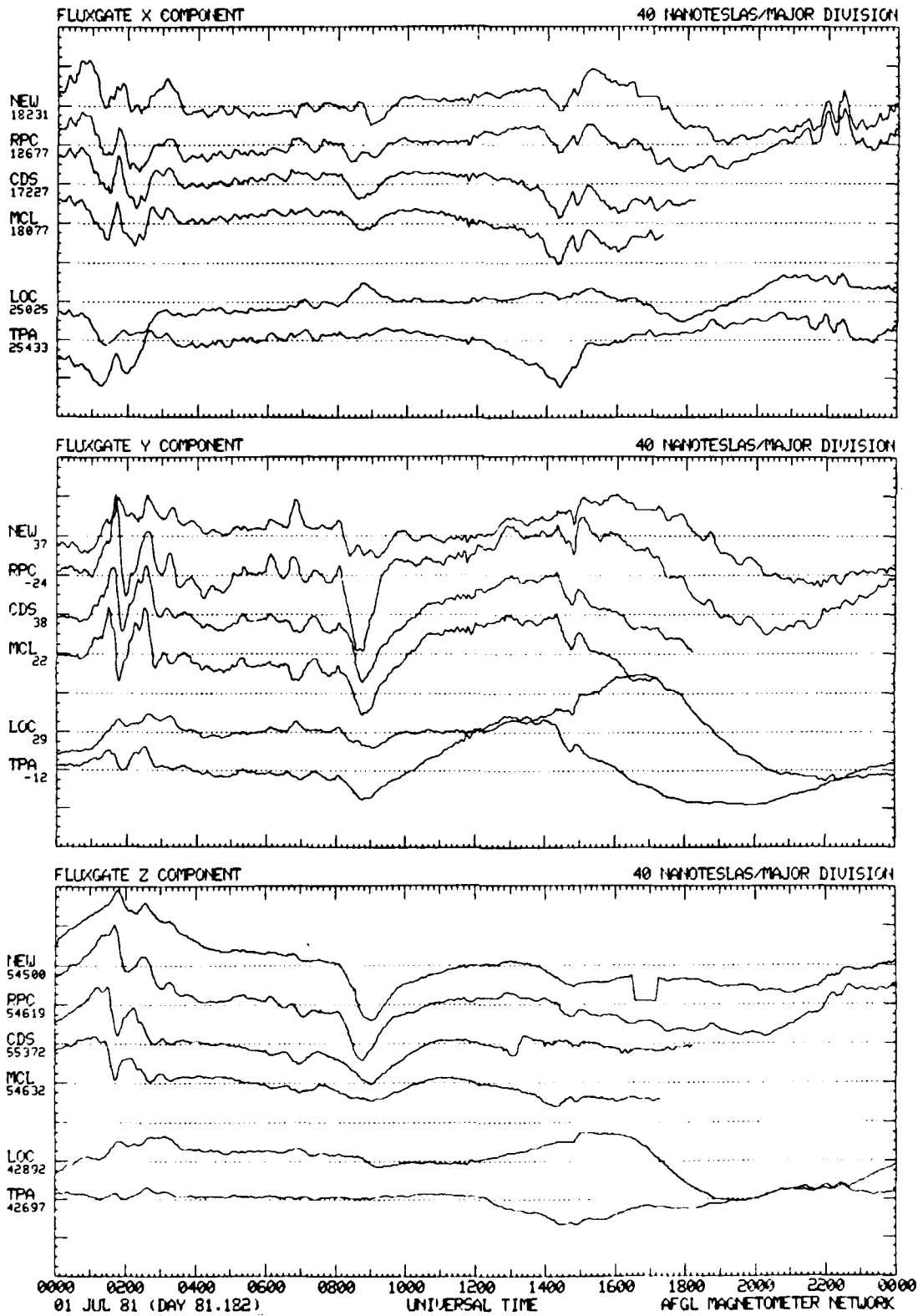
3/5

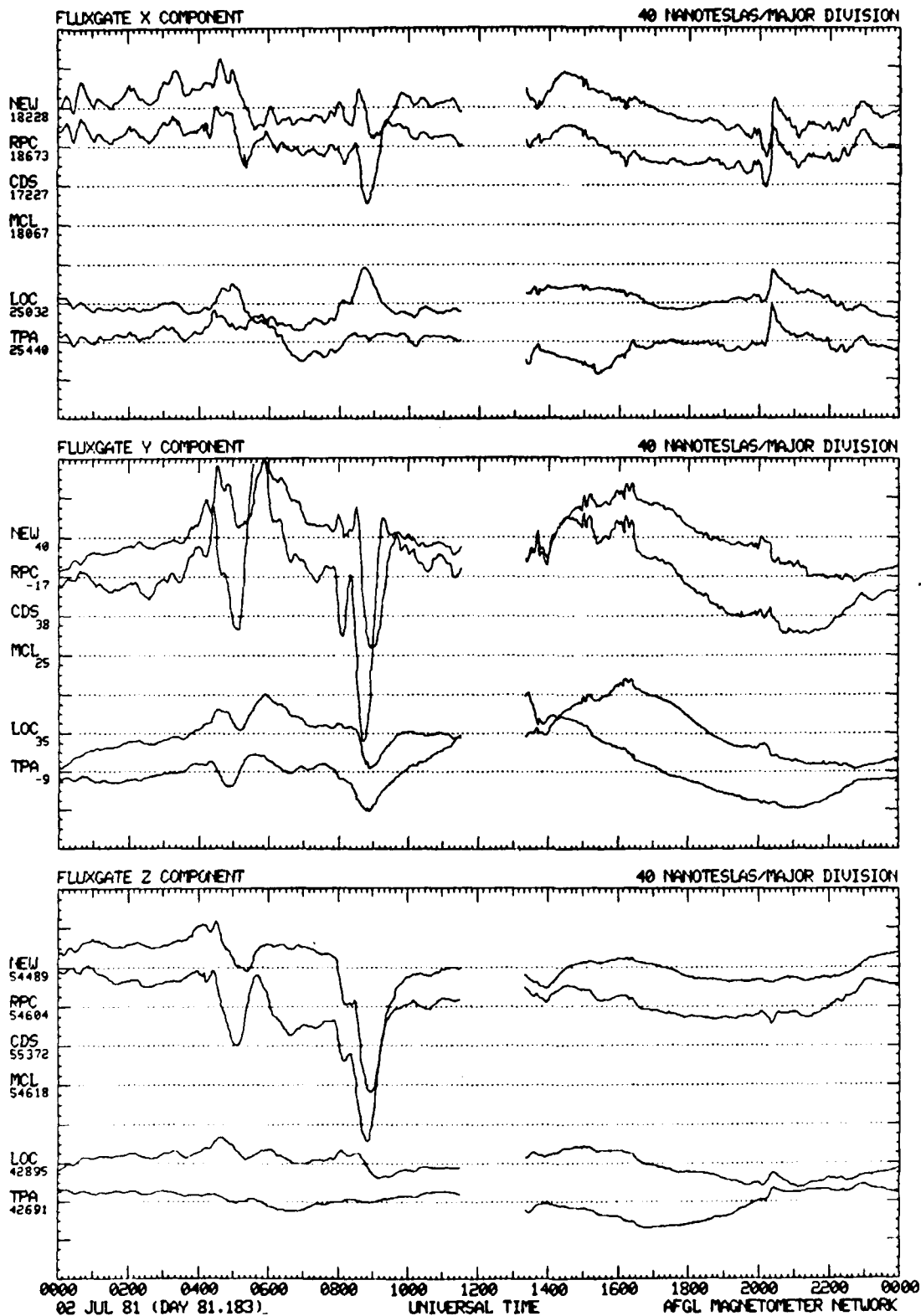
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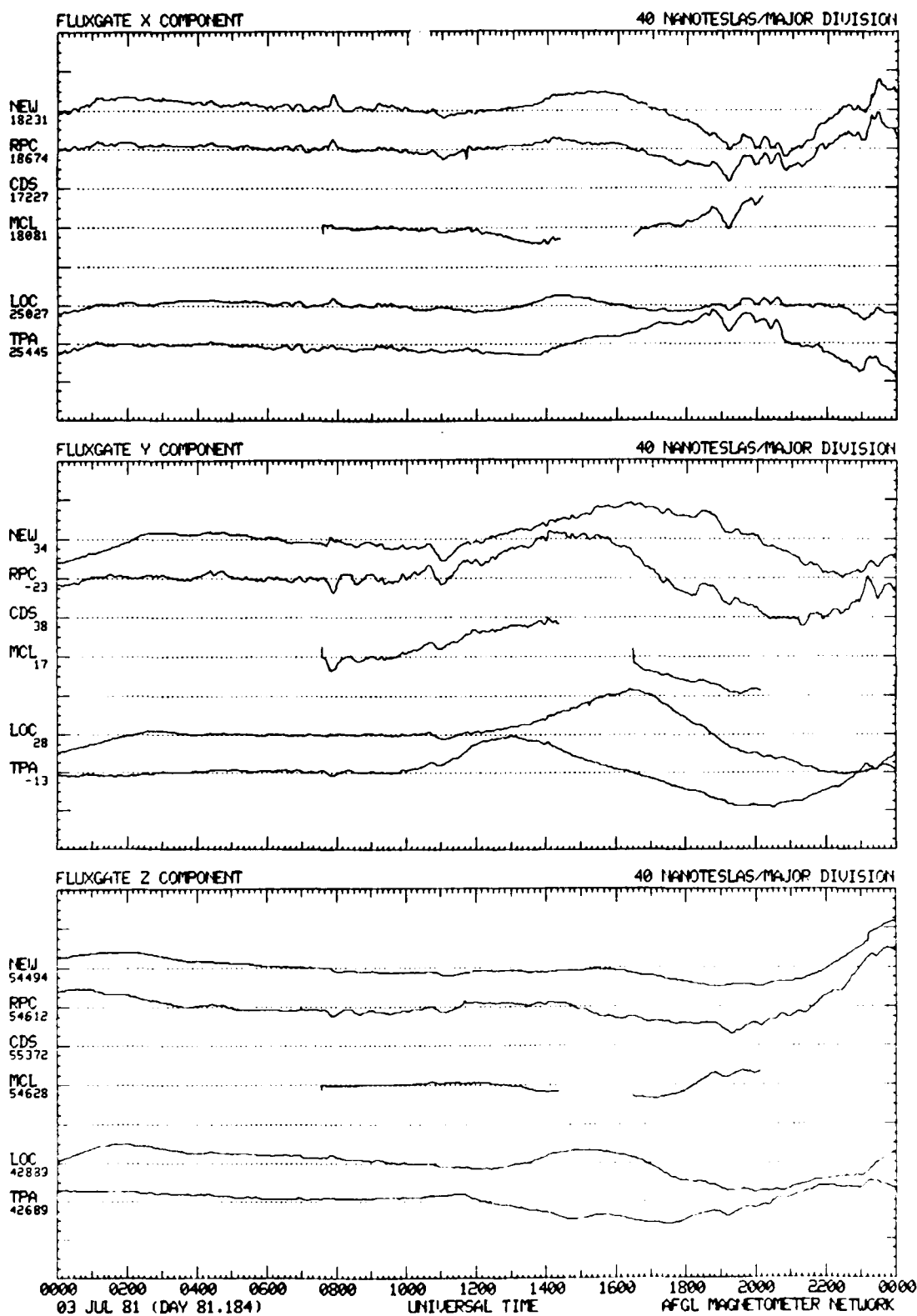


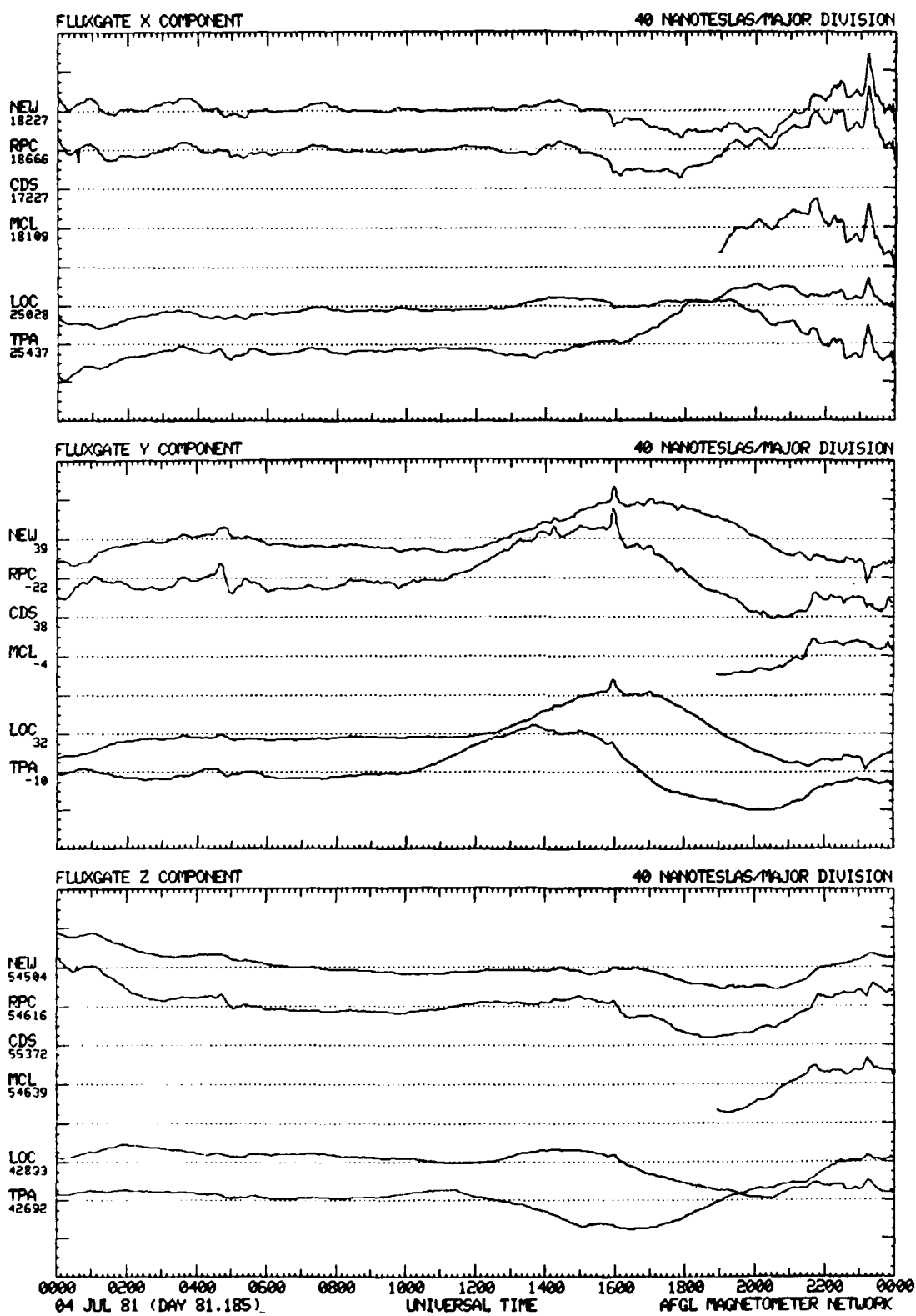
MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

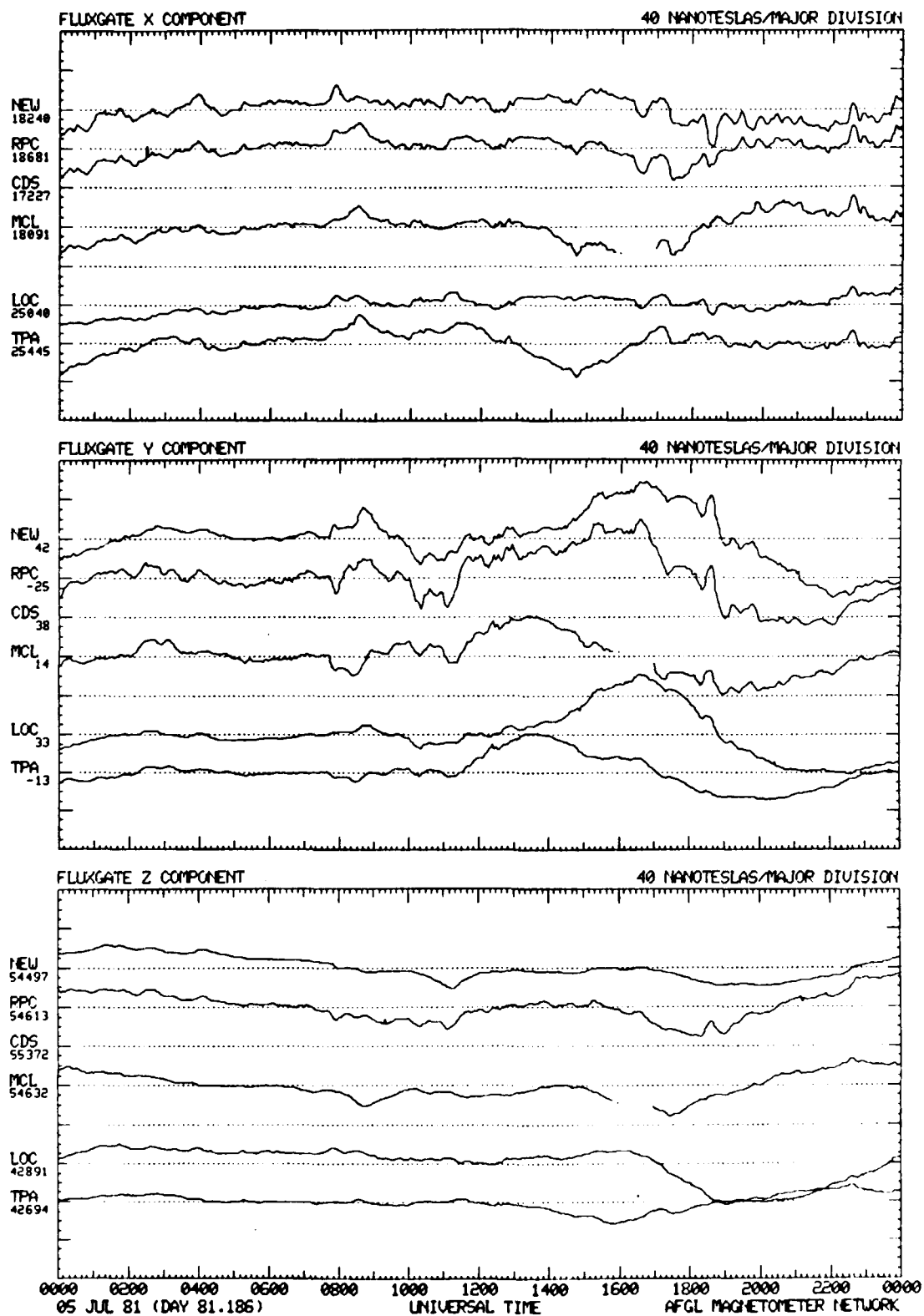




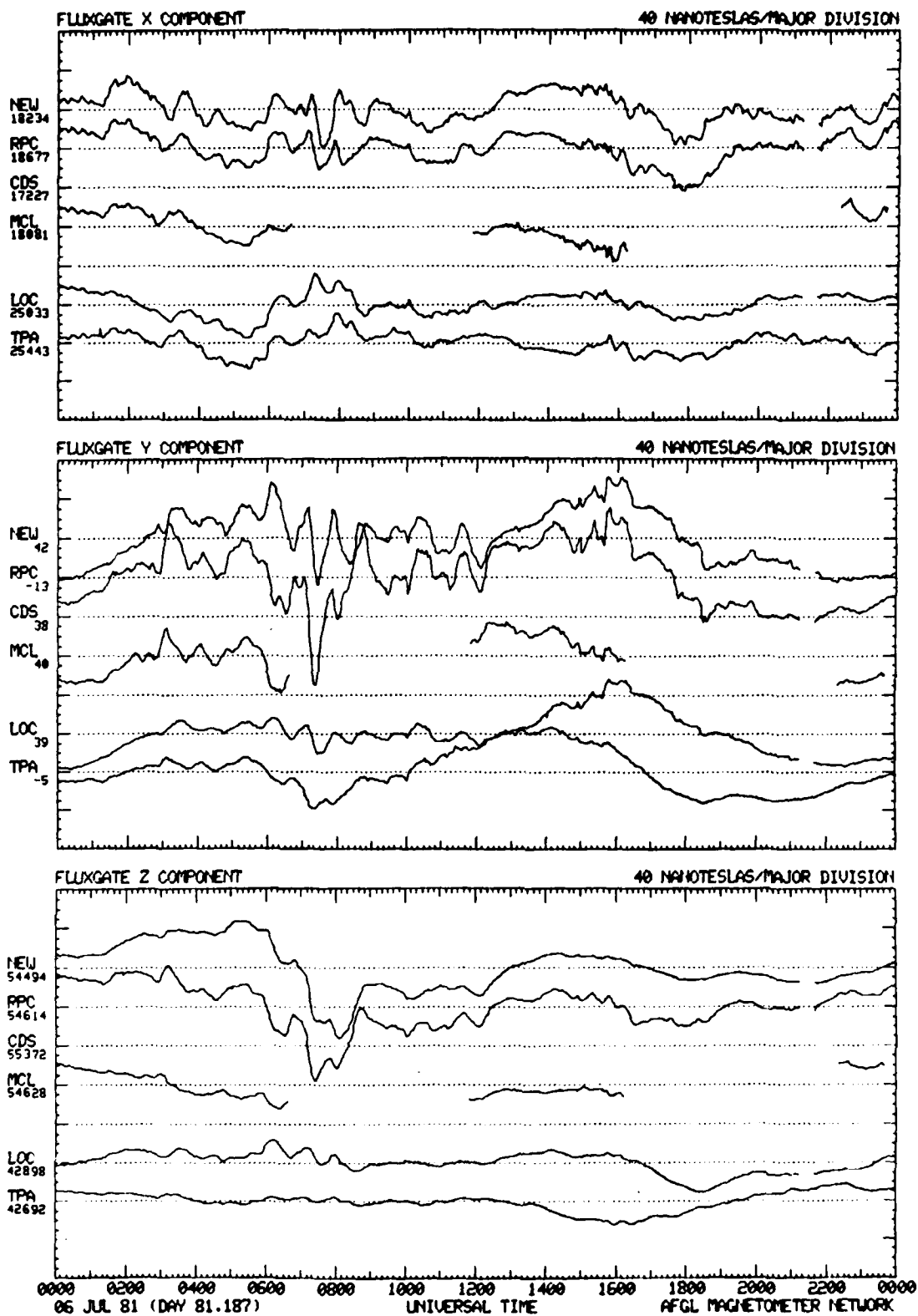


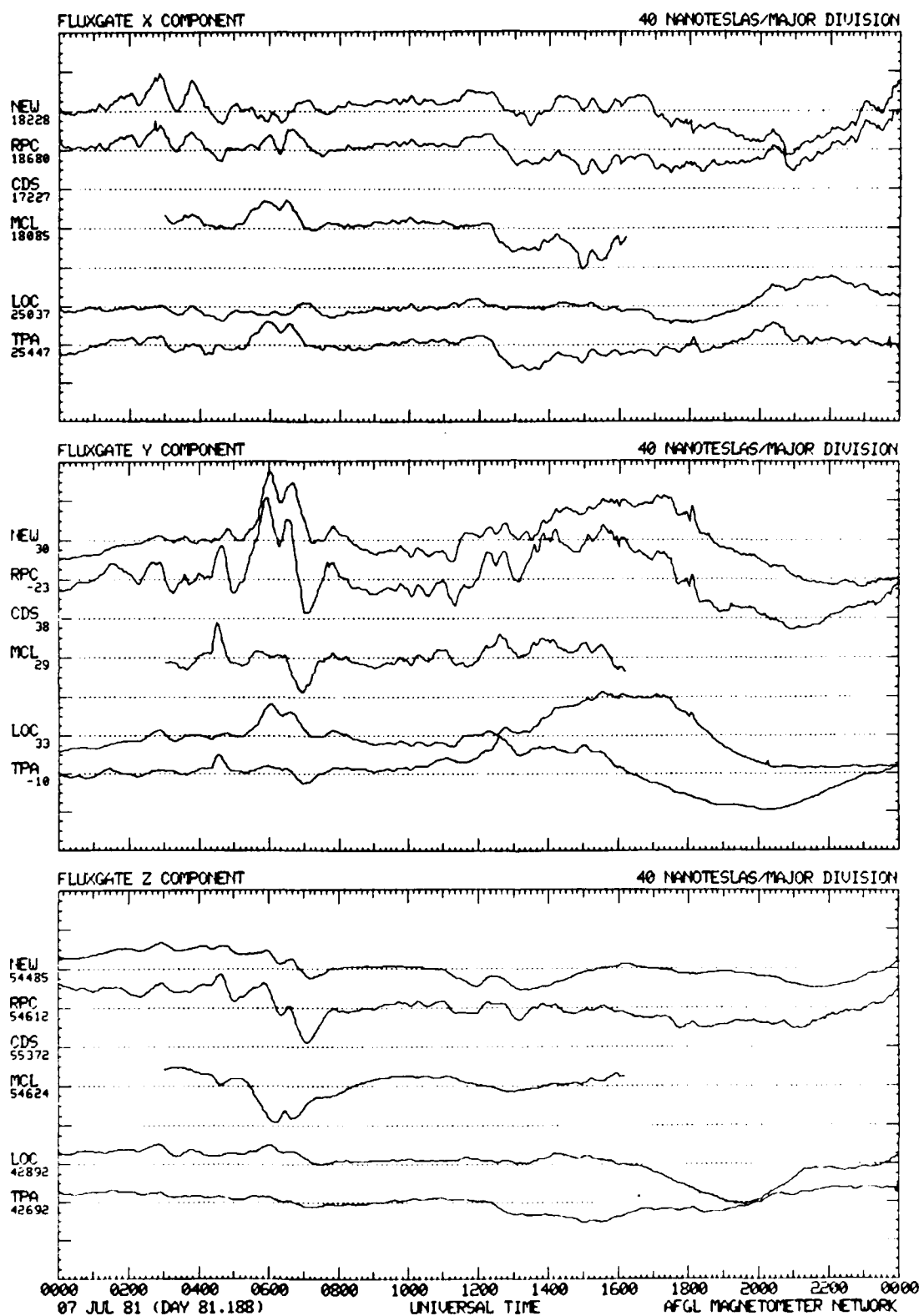


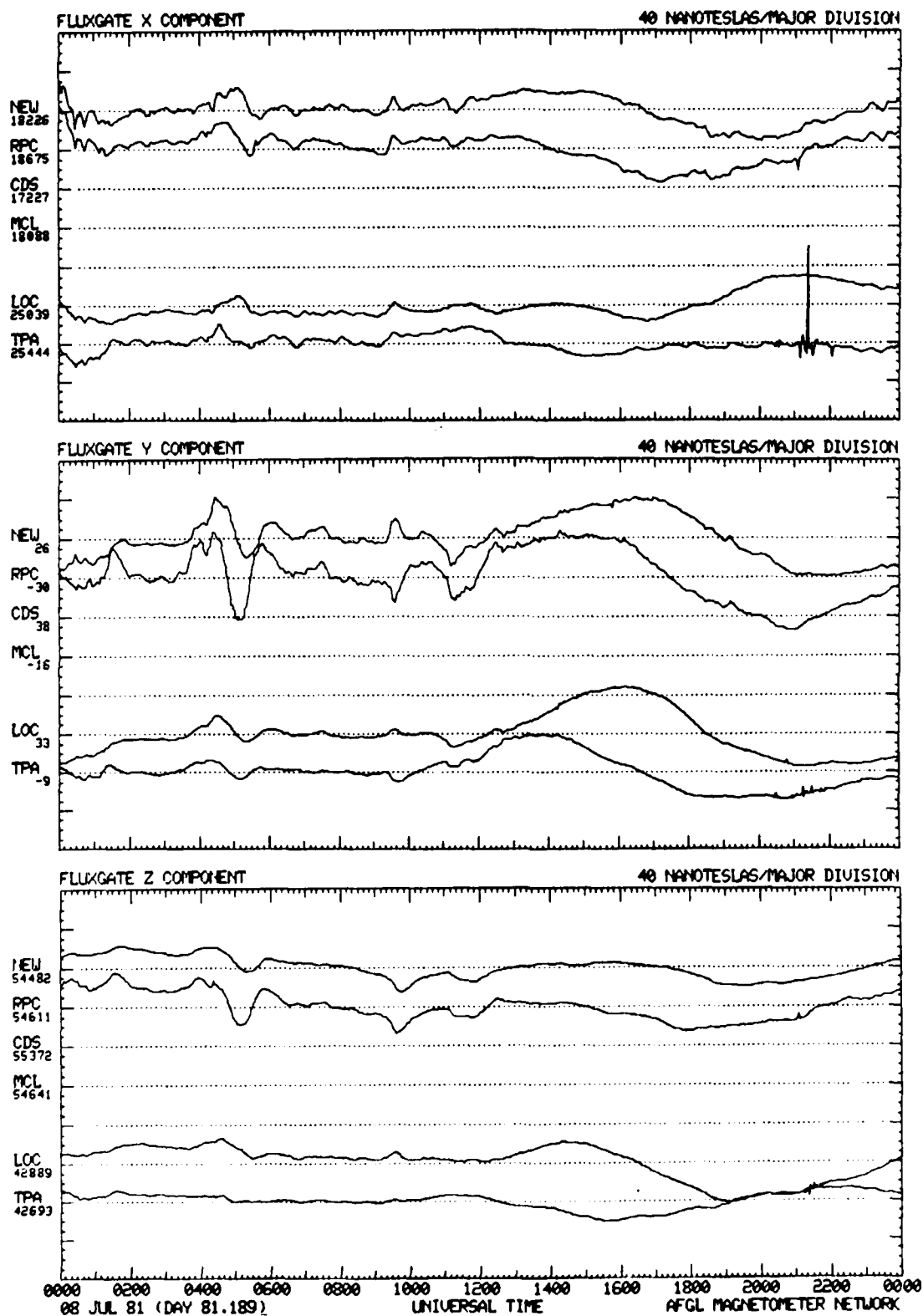


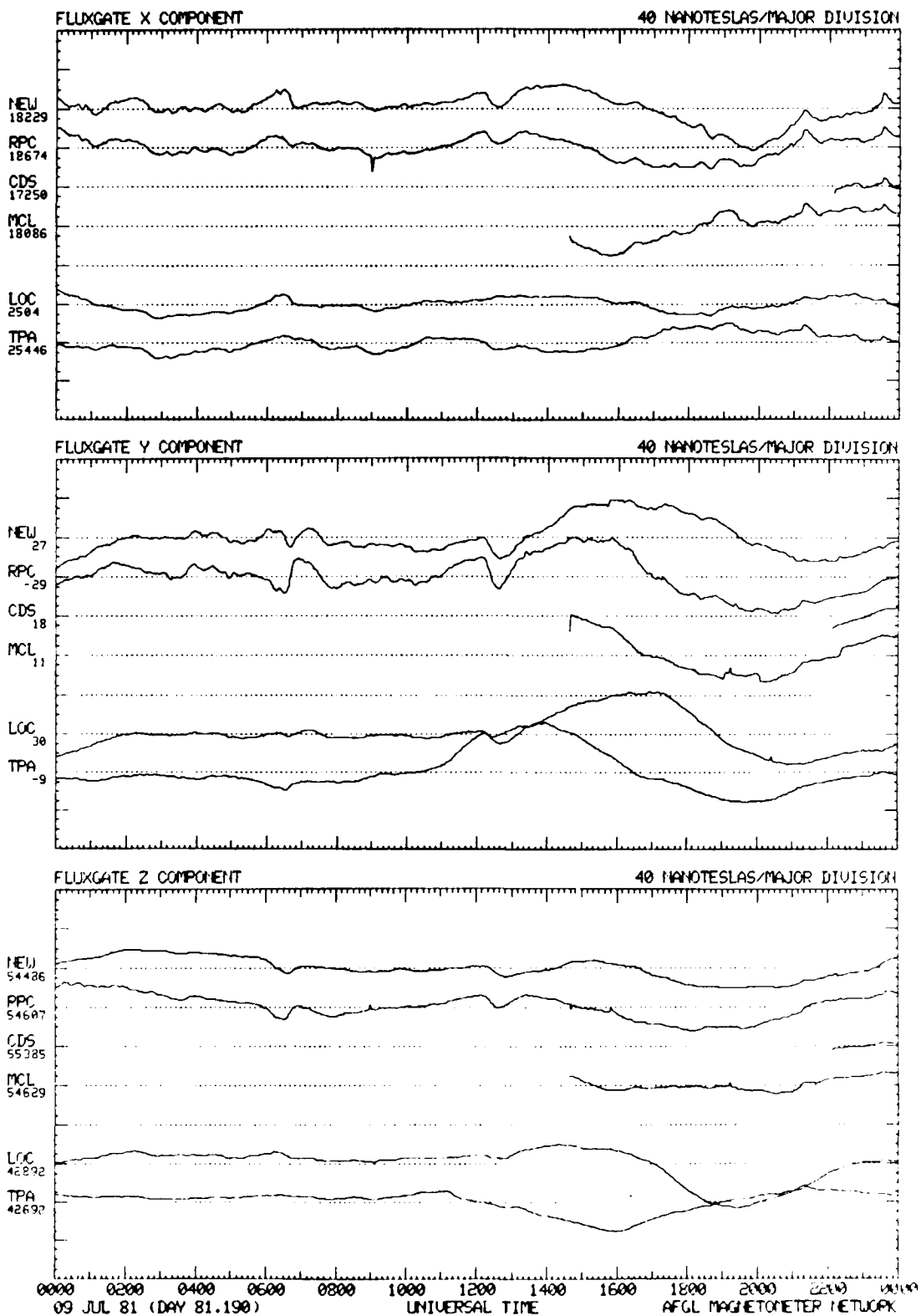


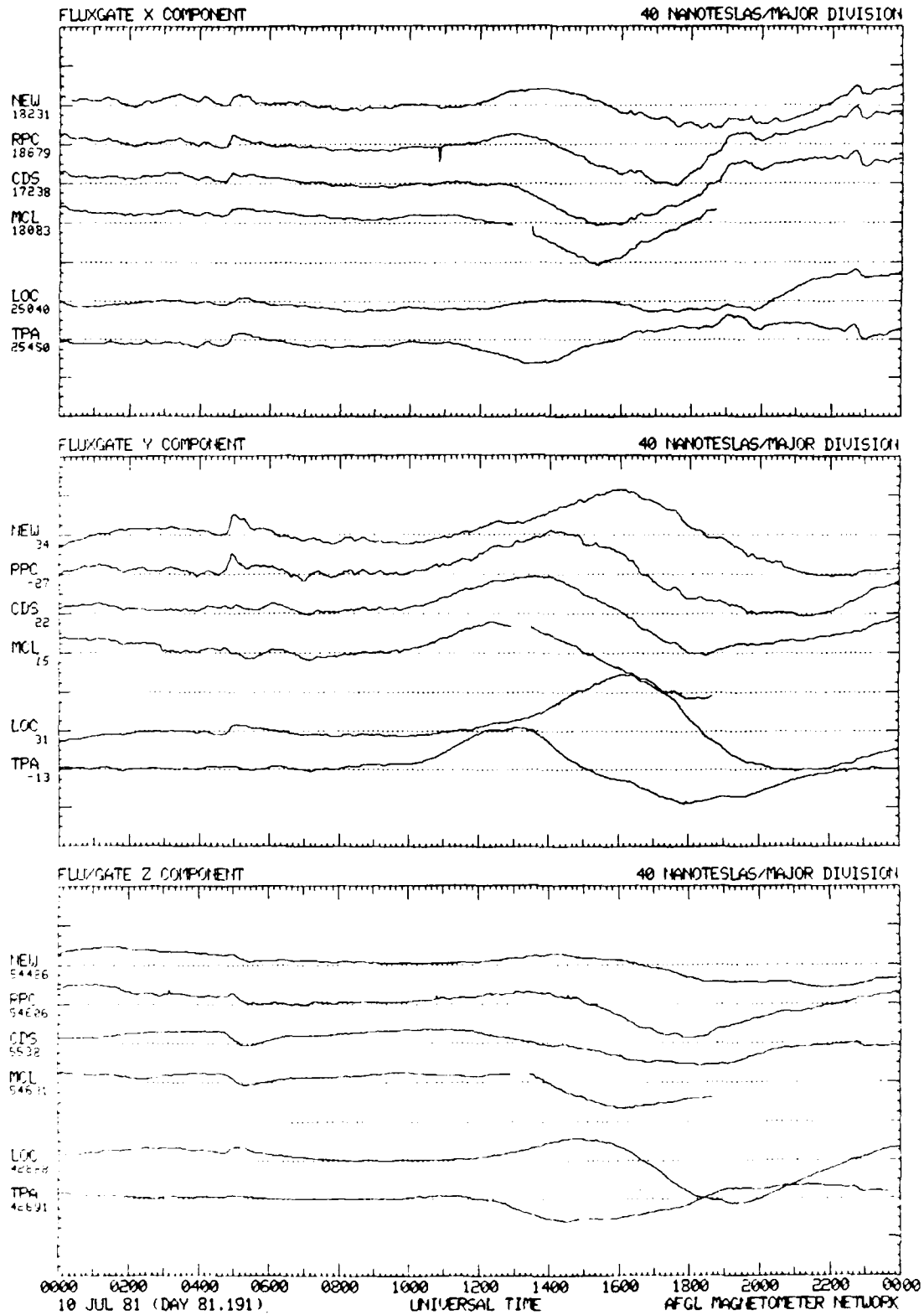


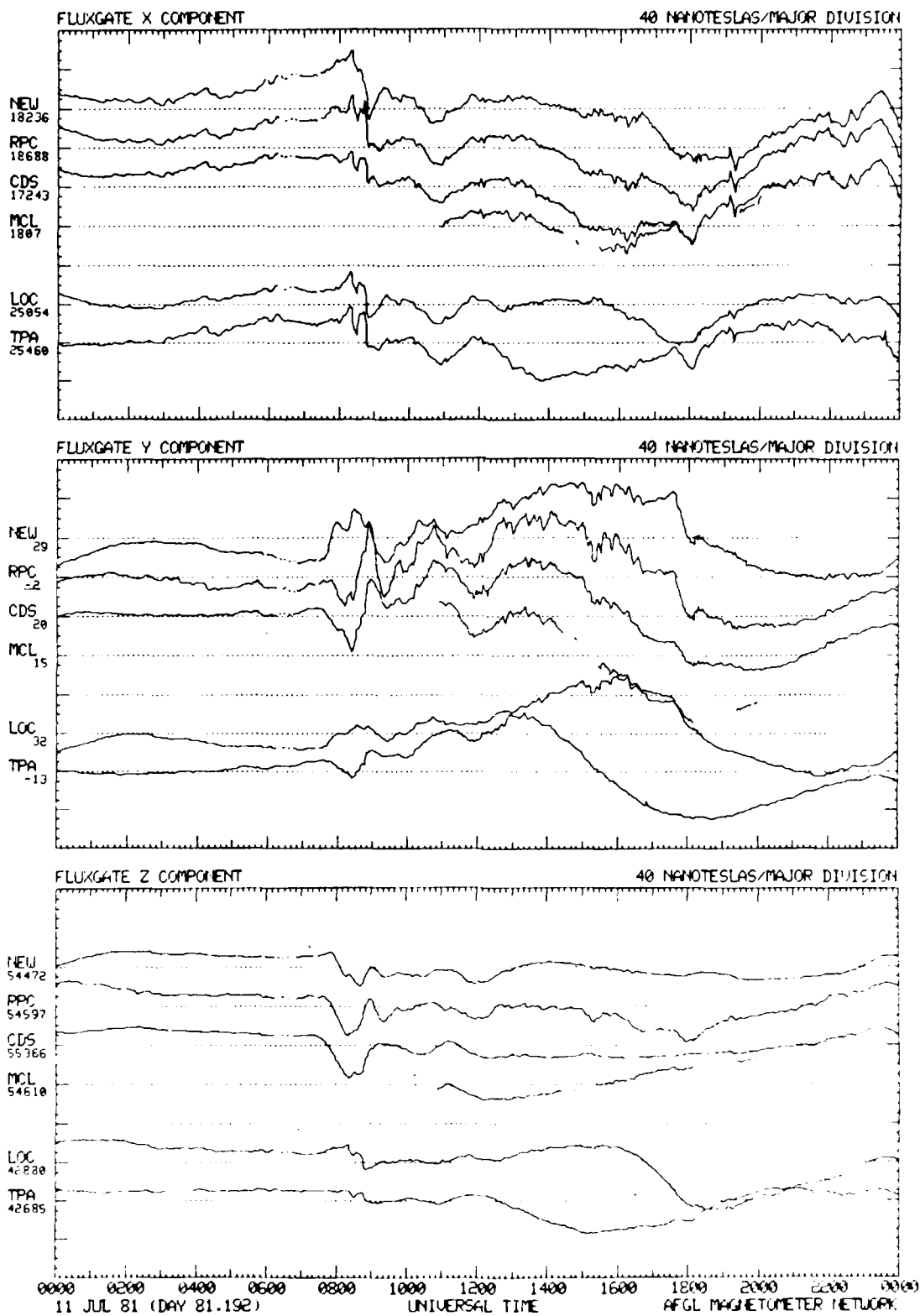


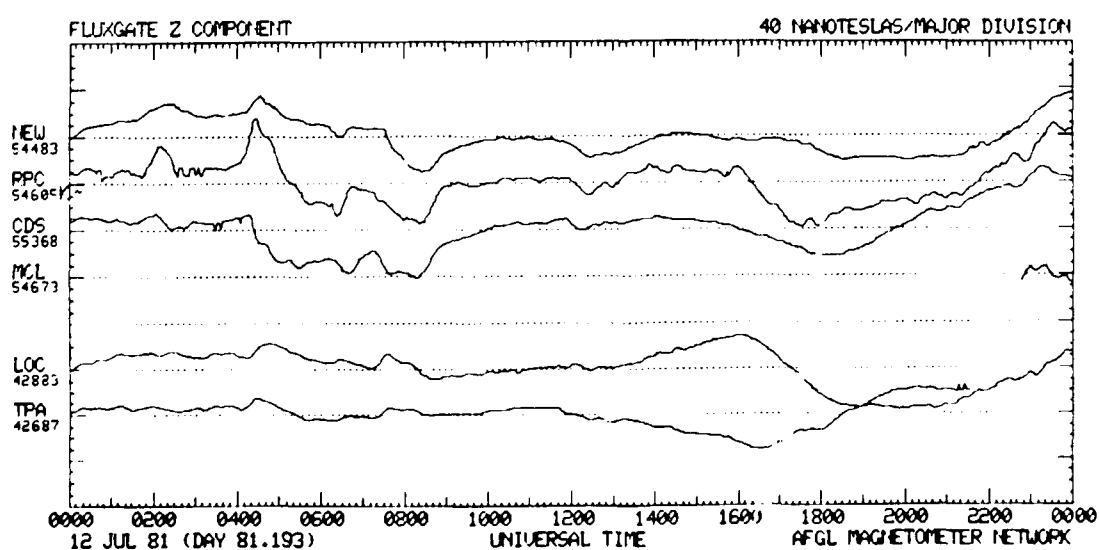
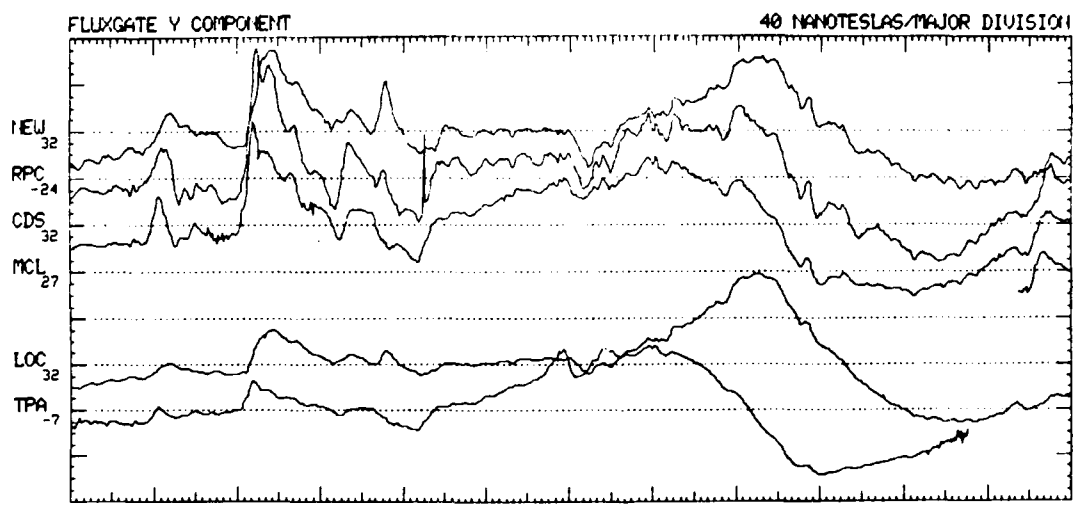
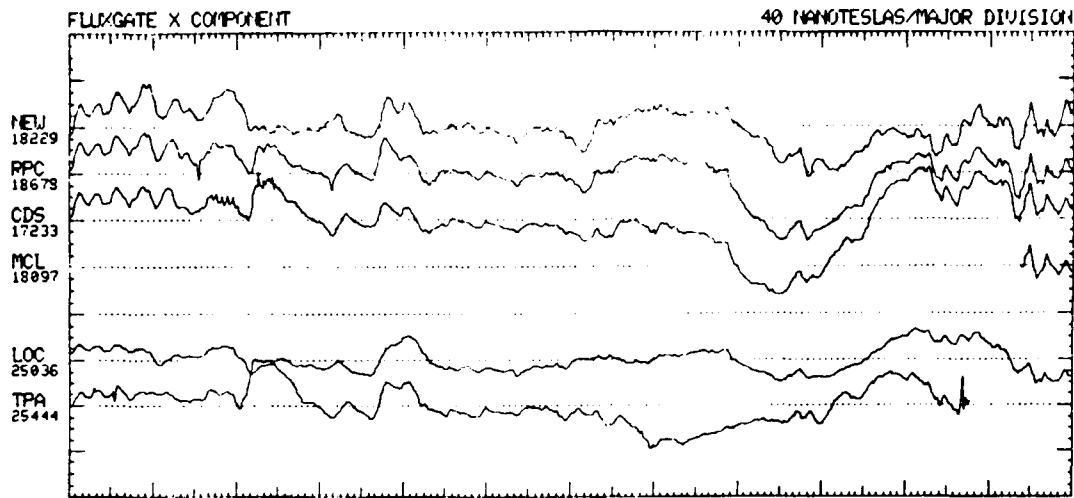




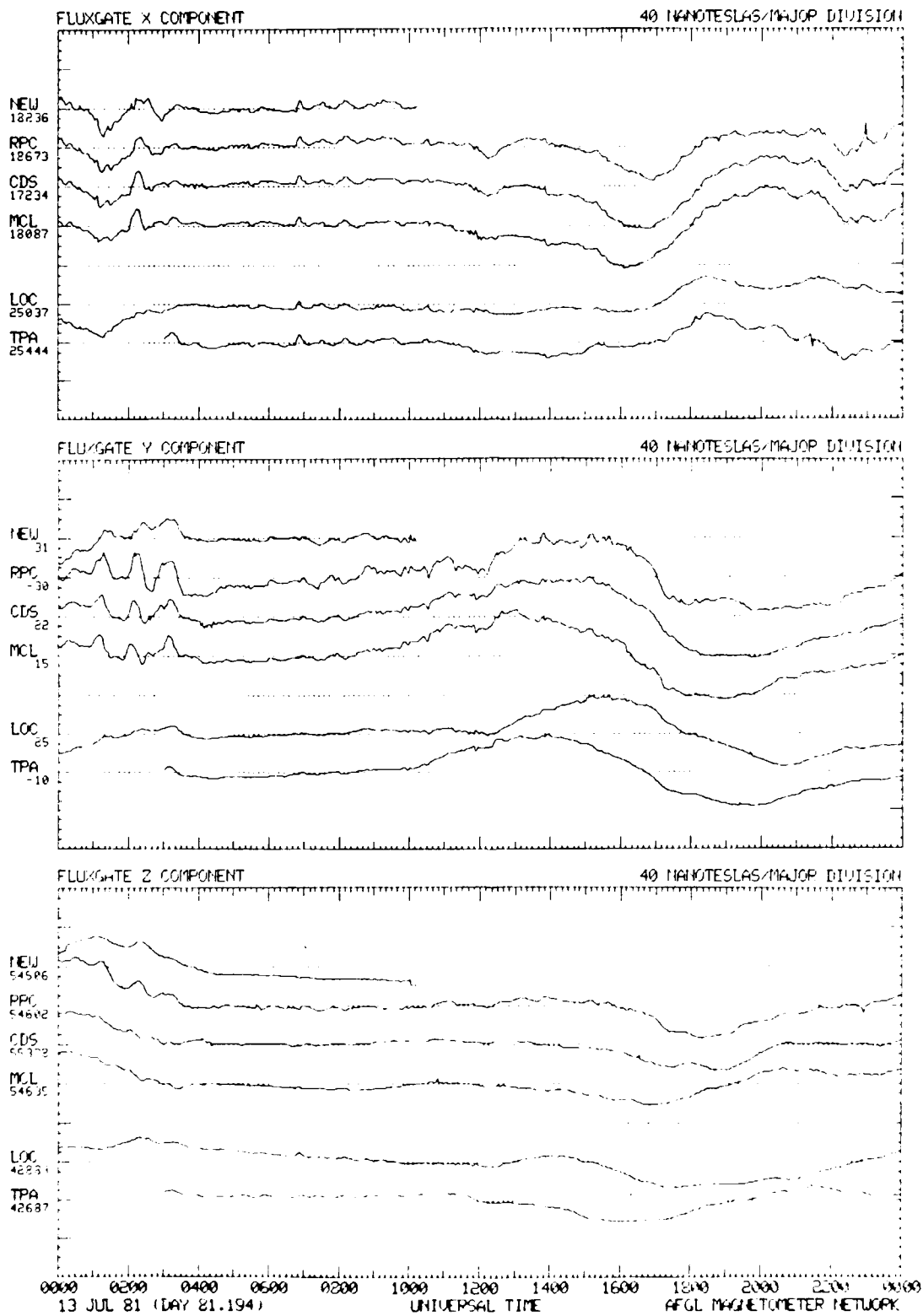




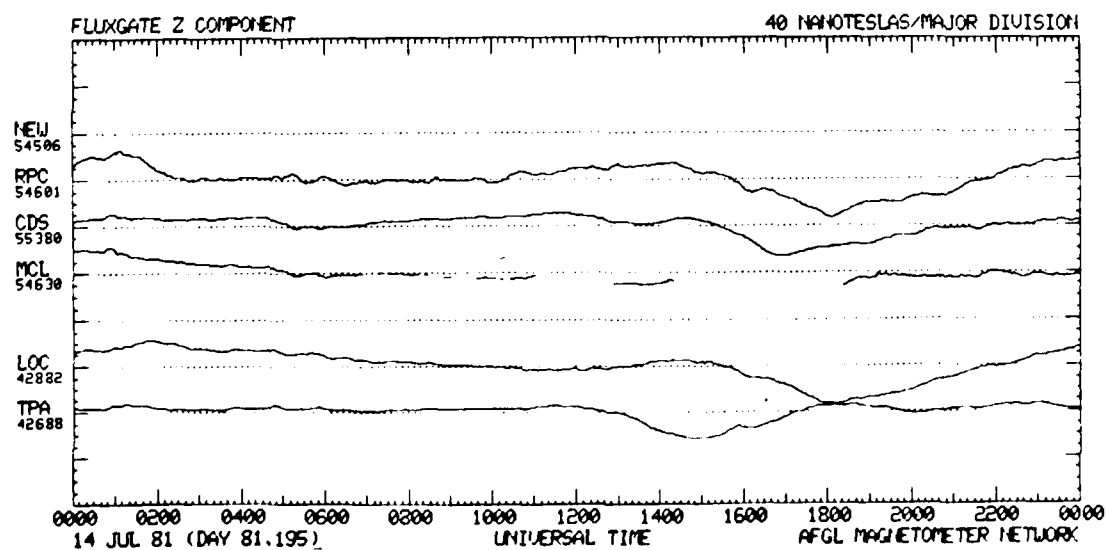
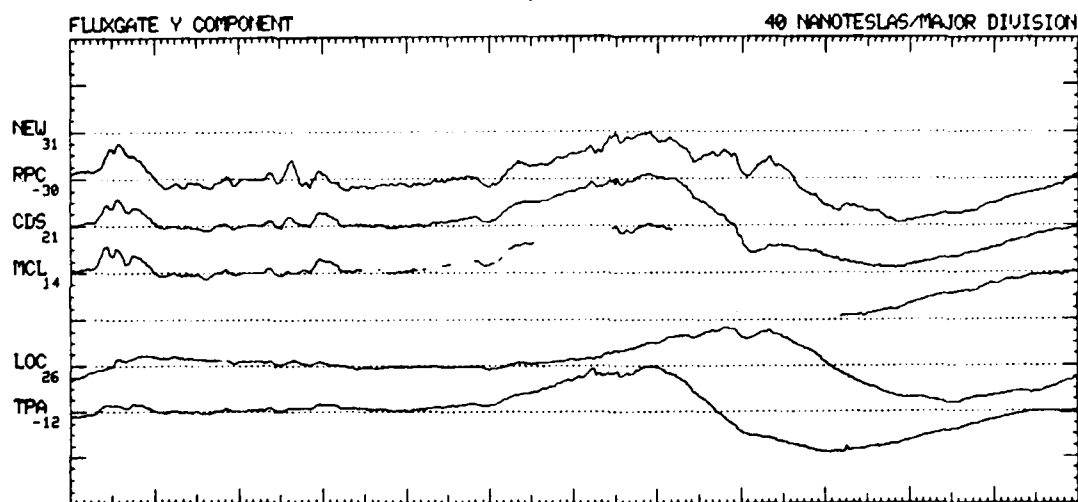
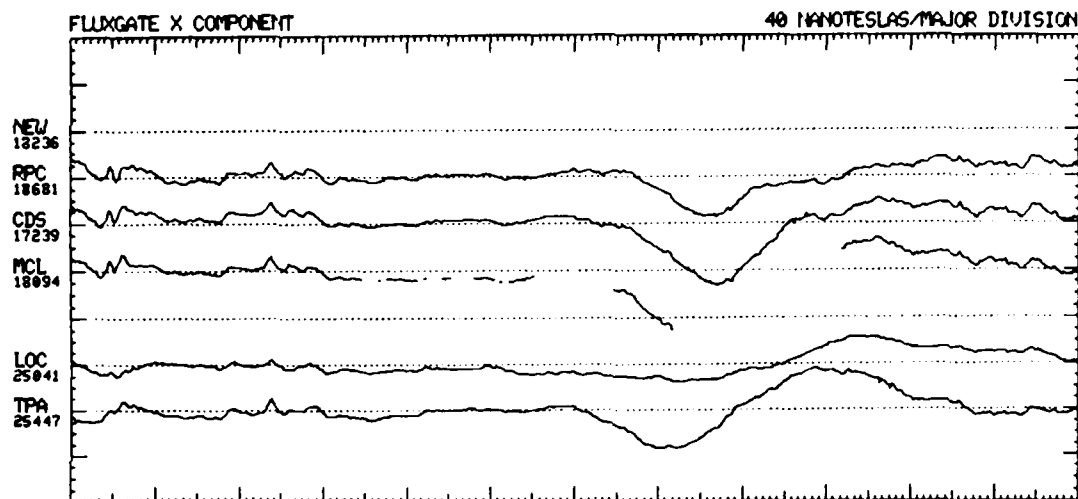


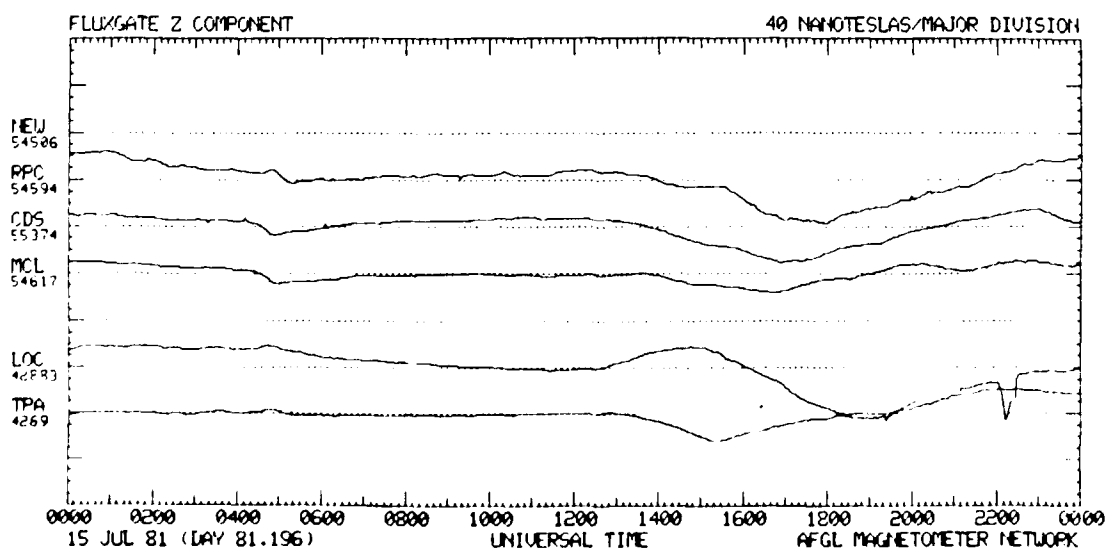
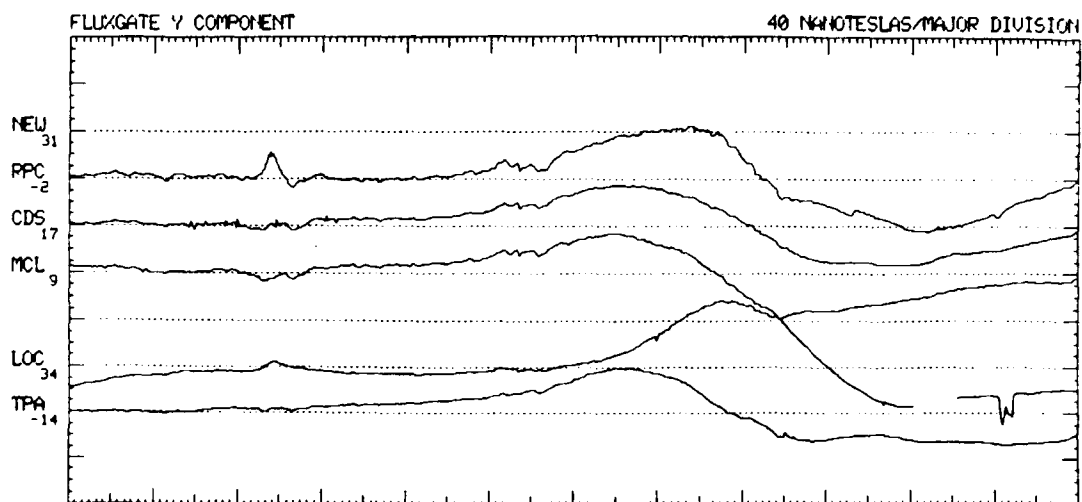
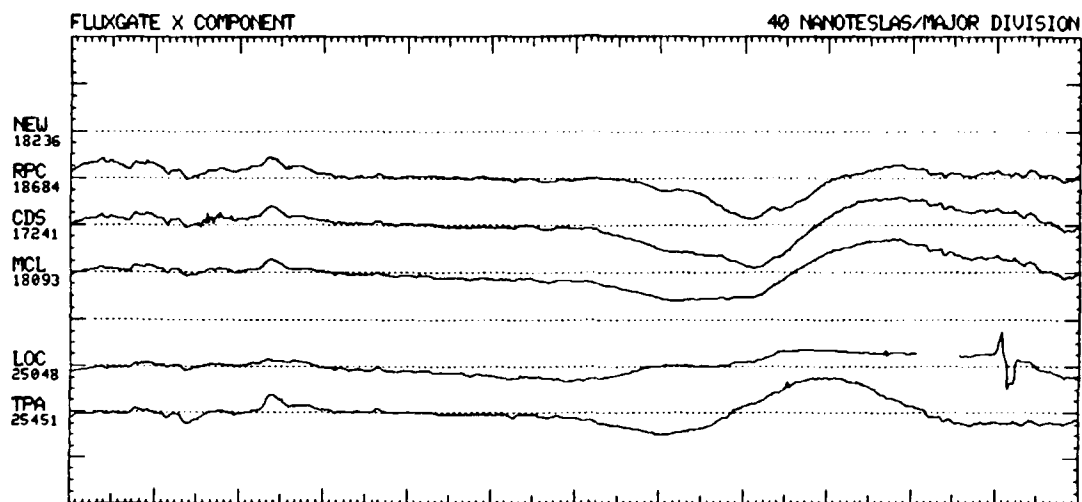


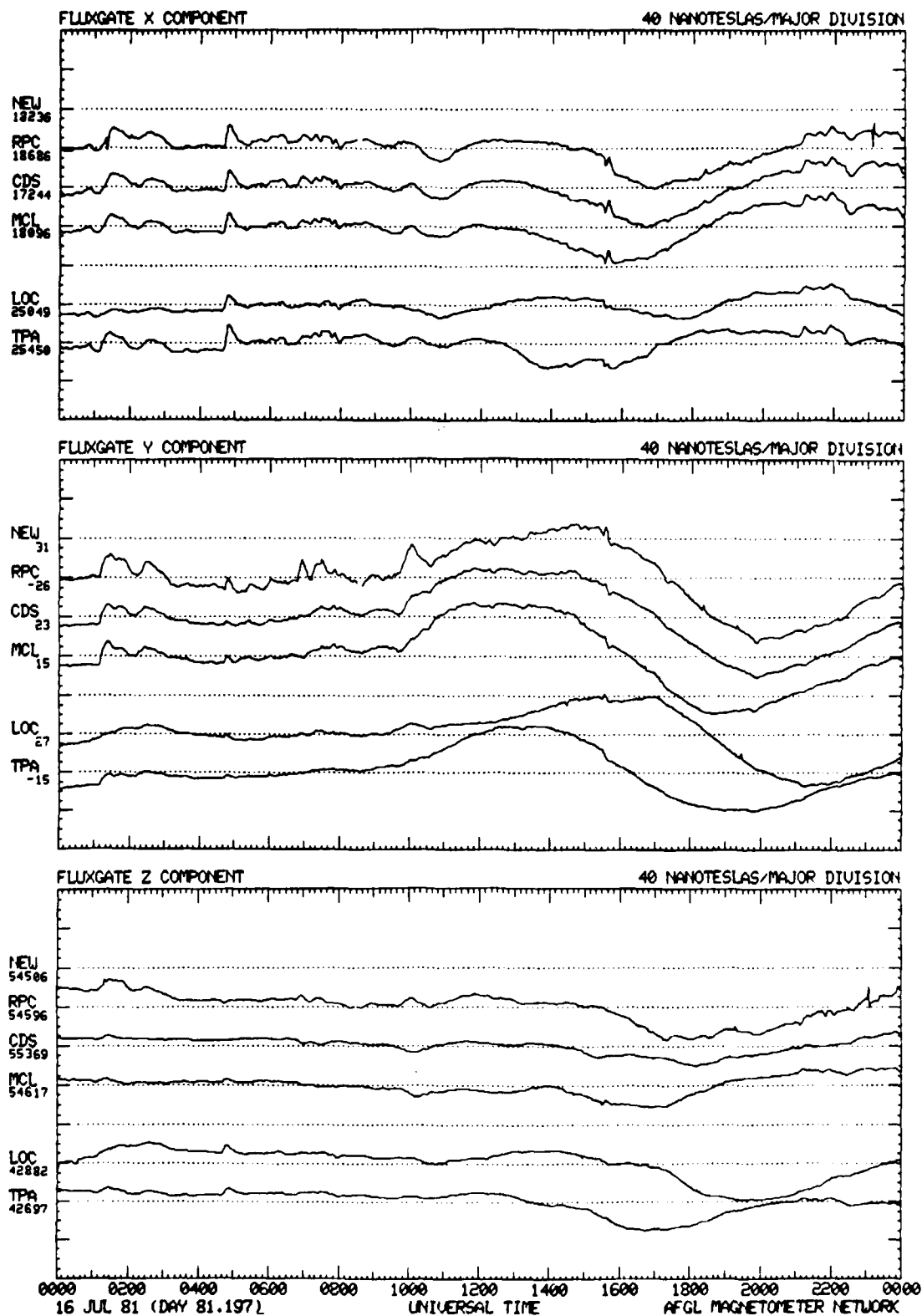
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12 JUL 81 (DAY 81.193) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

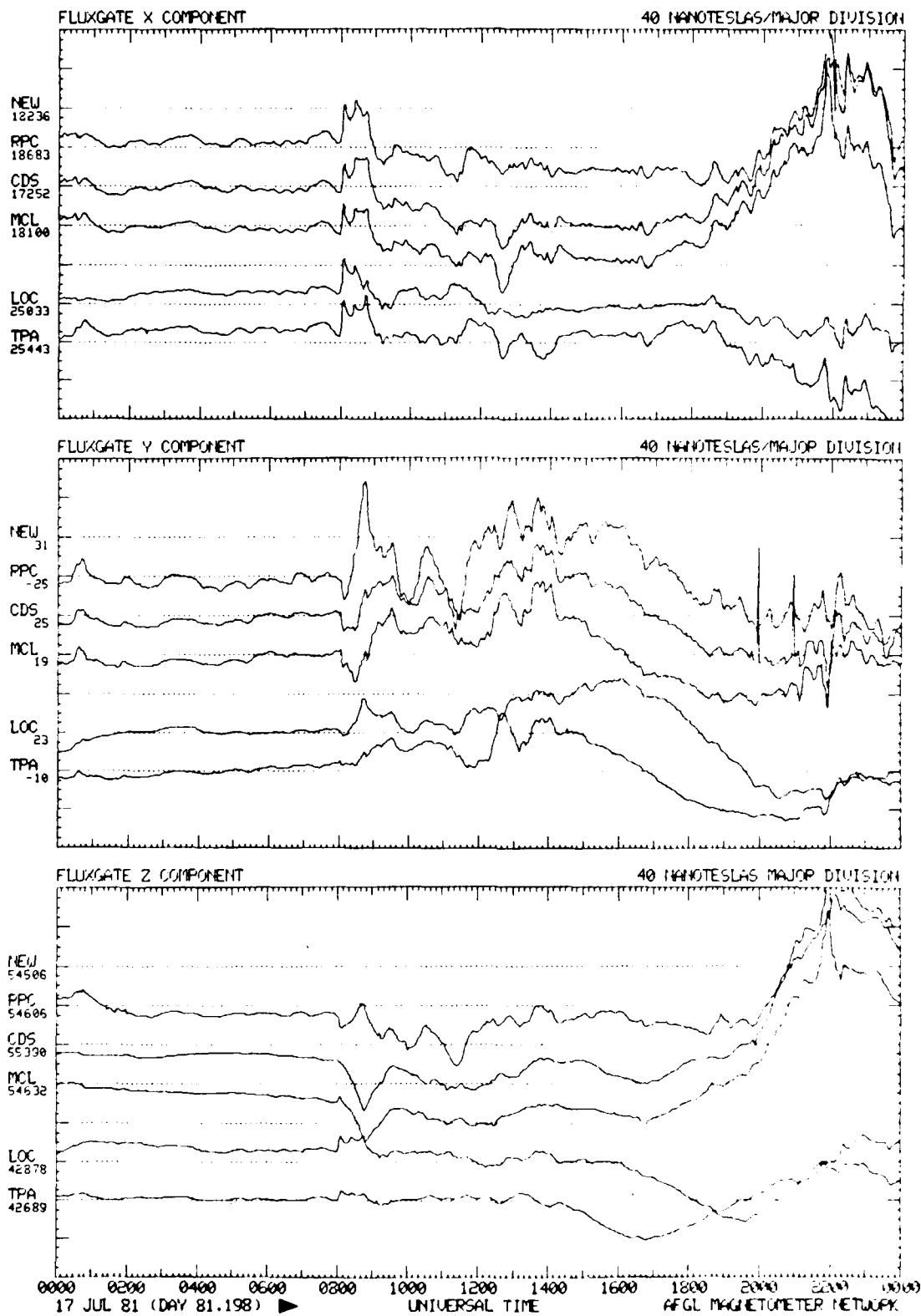


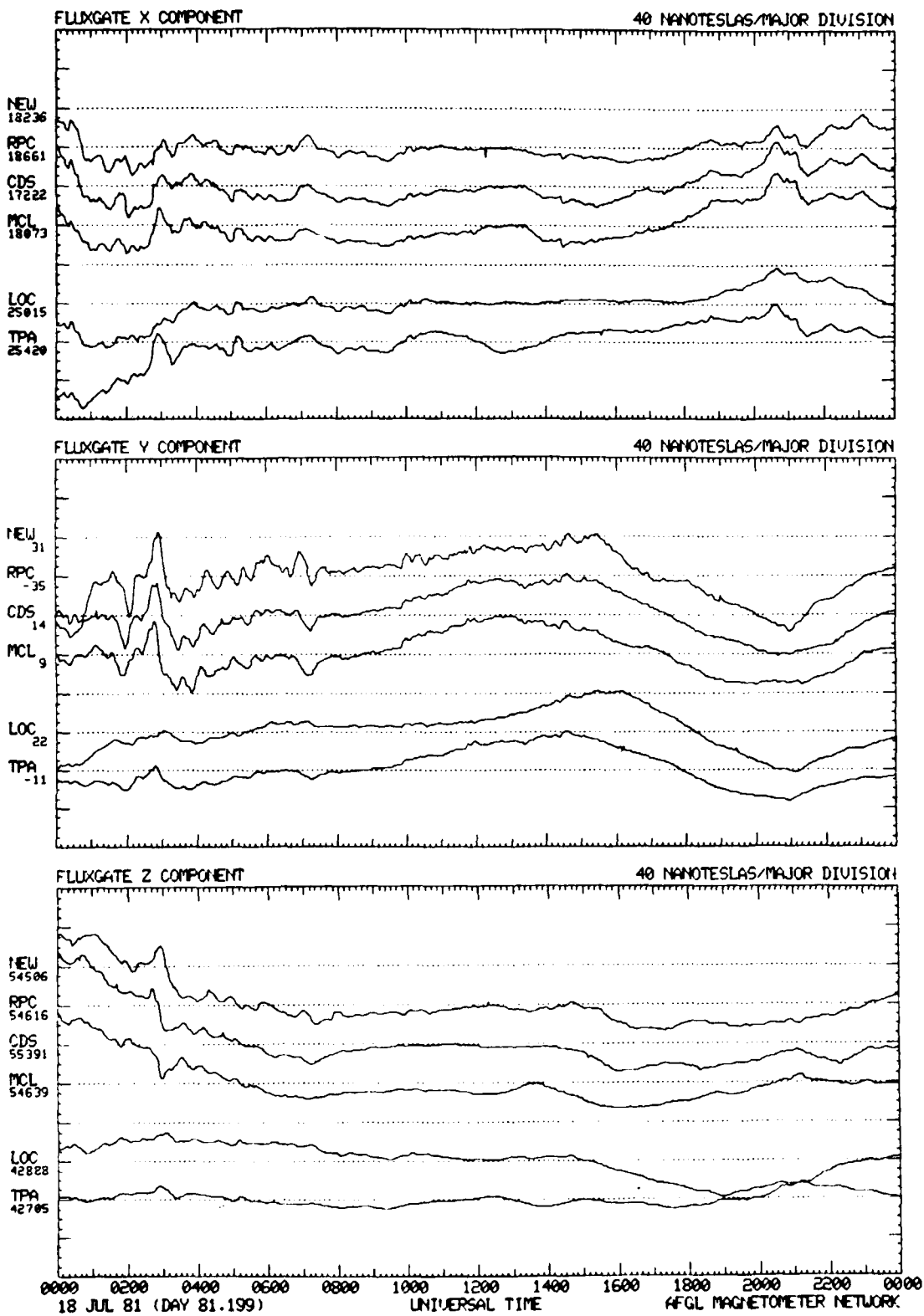


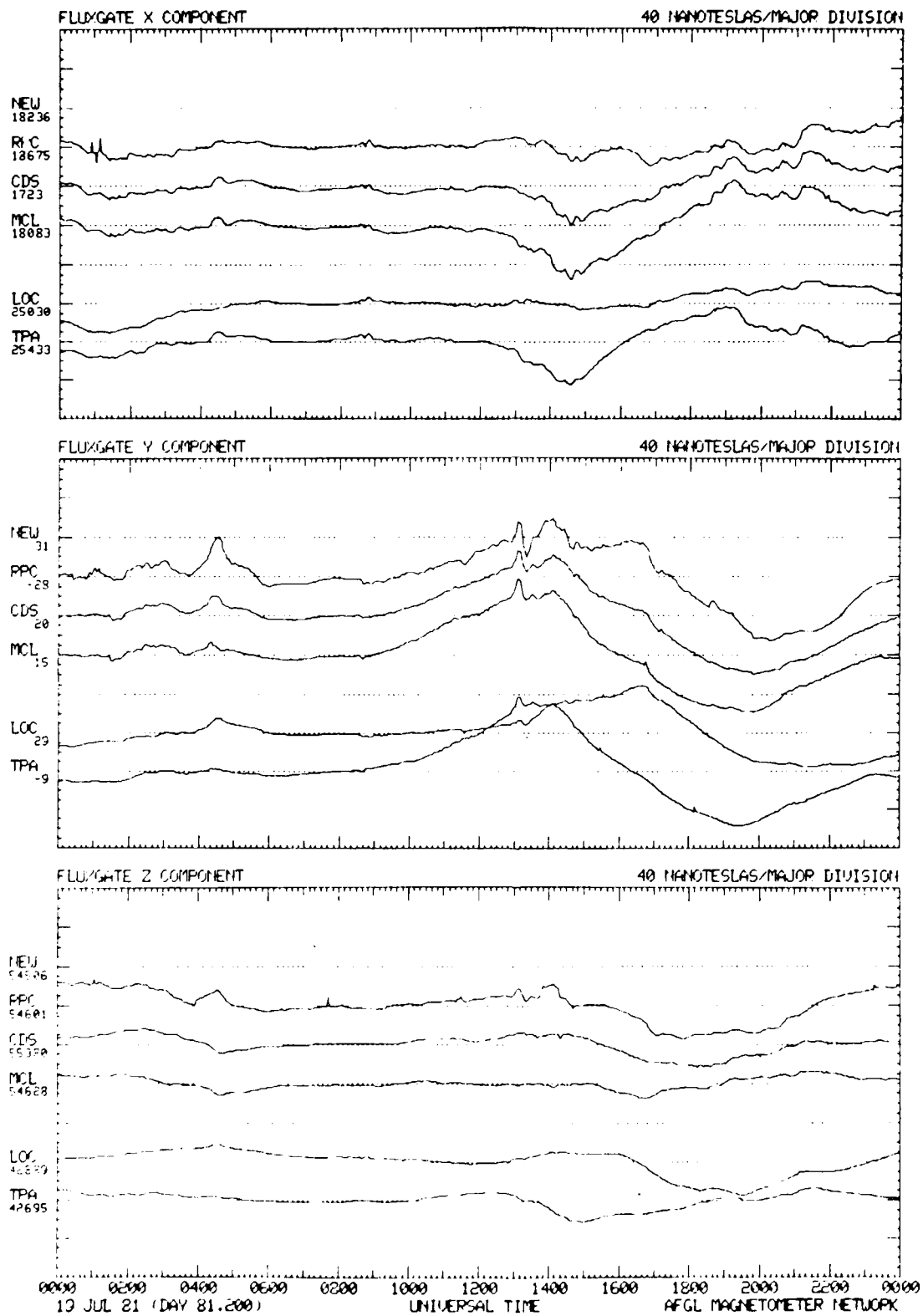


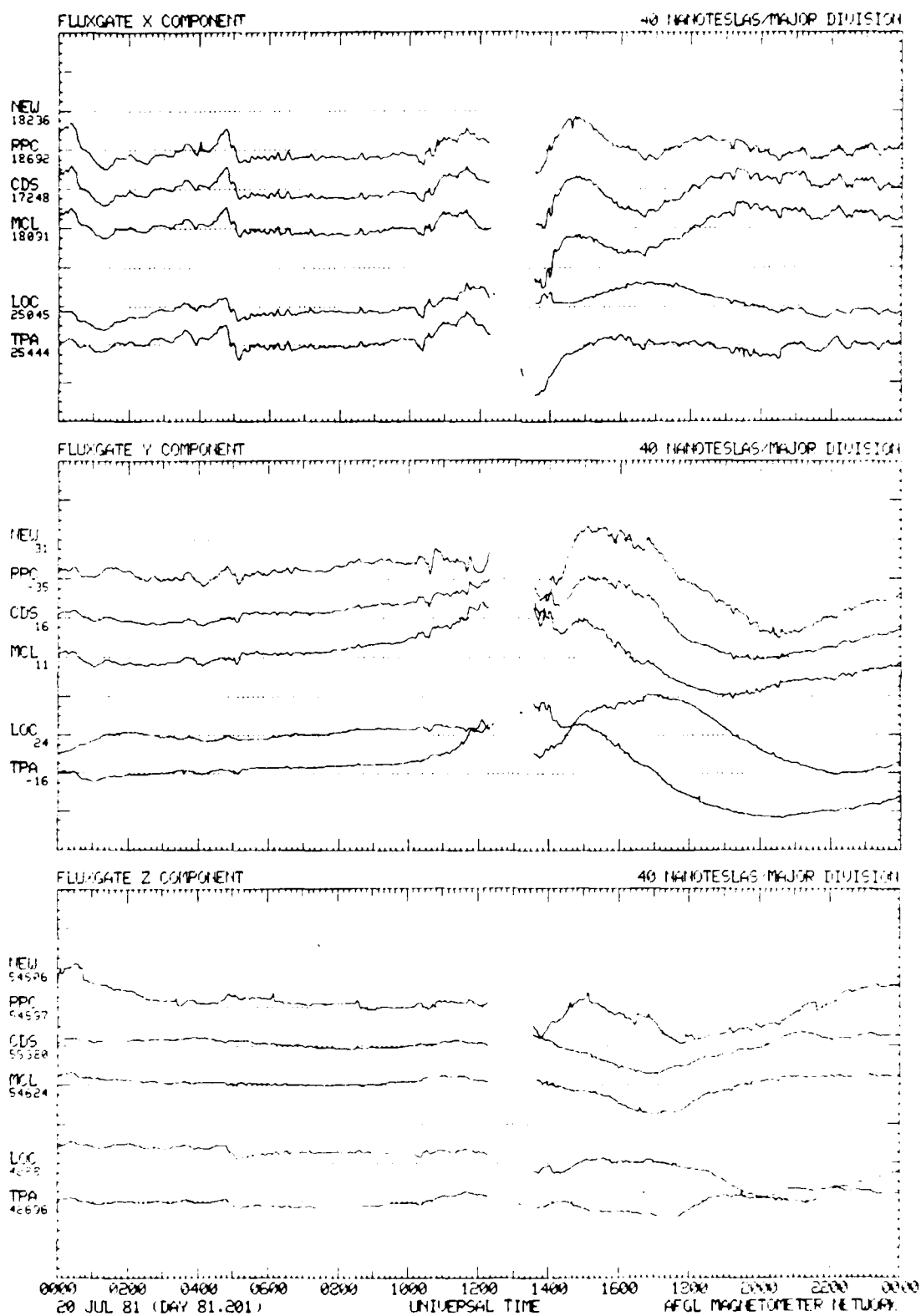






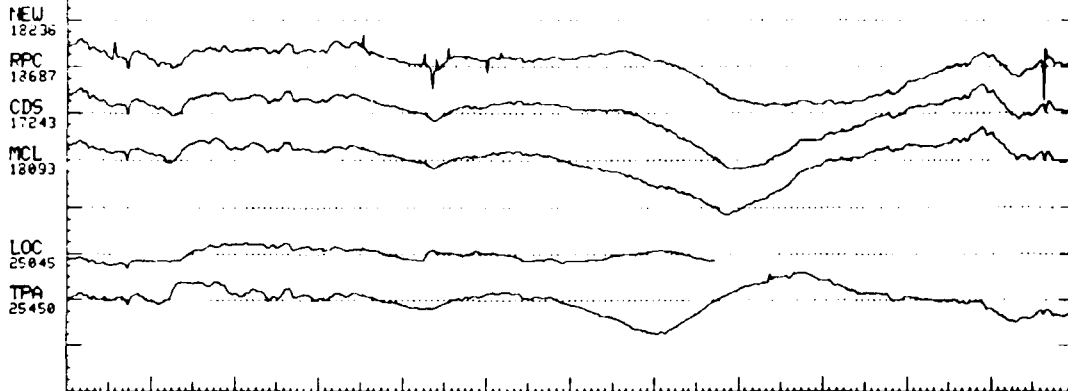






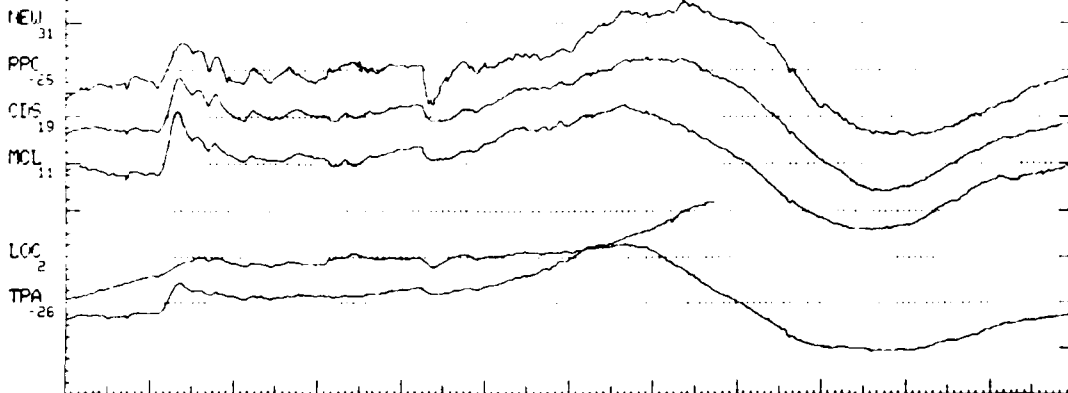
FLUXGATE X COMPONENT

40 NANOTESLAS/MAJOR DIVISION



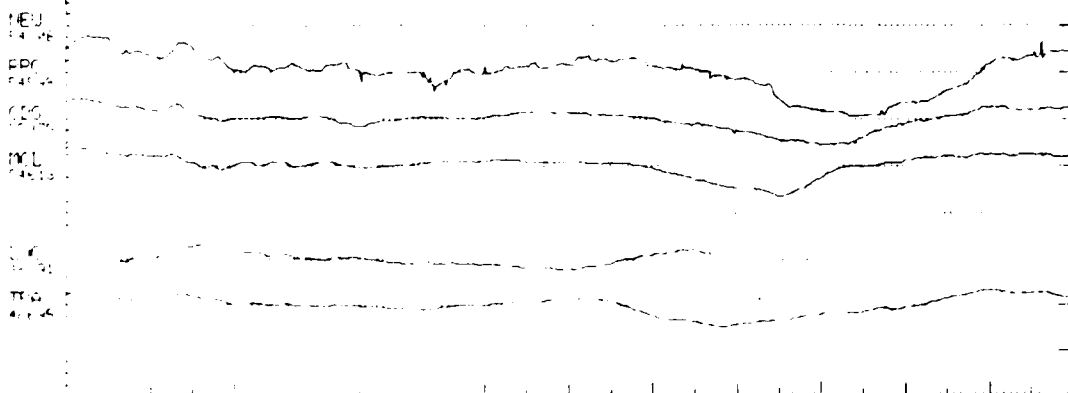
FLUXGATE Y COMPONENT

40 NANOTESLAS/MAJOR DIVISION



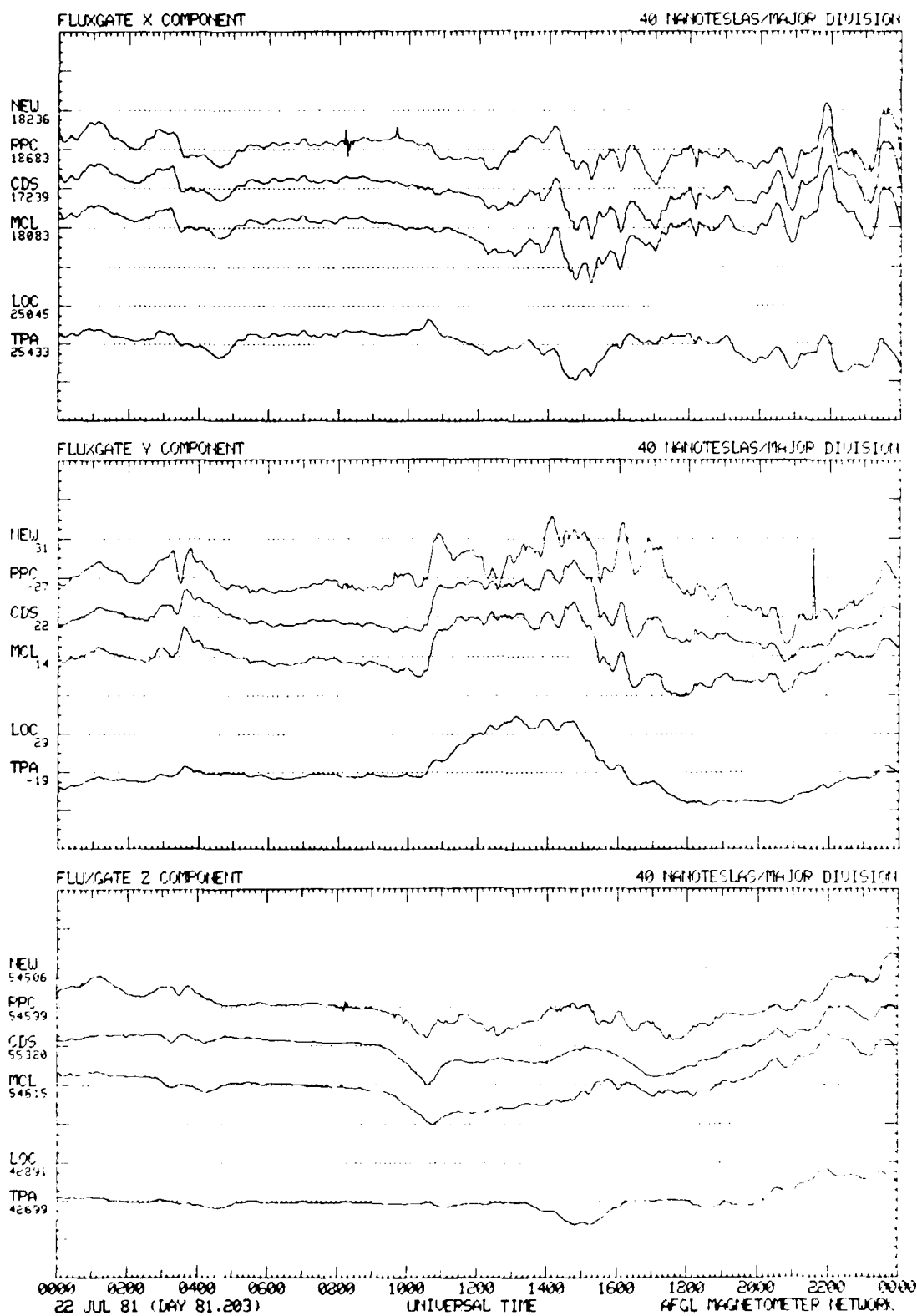
FLUXGATE Z COMPONENT

40 NANOTESLAS/MAJOR DIVISION



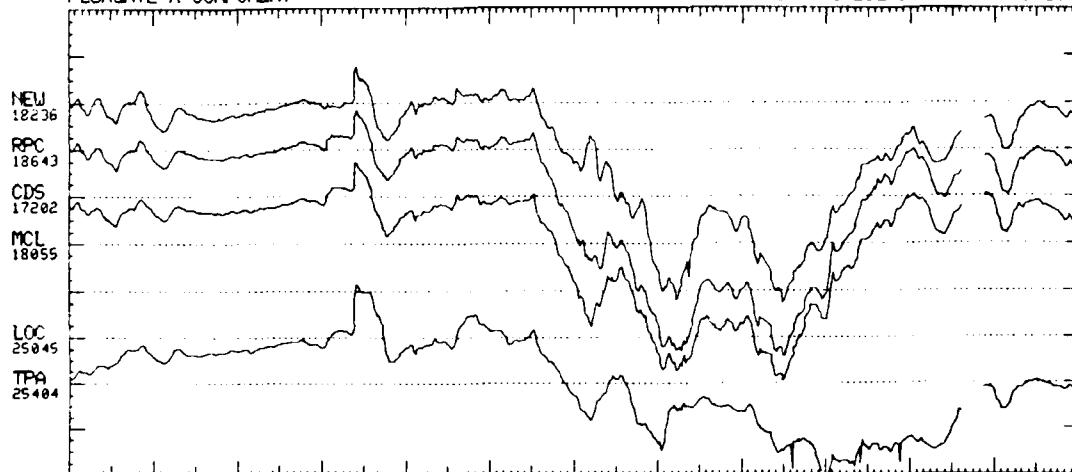
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21 JUL 81 (DAY 81.202) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK





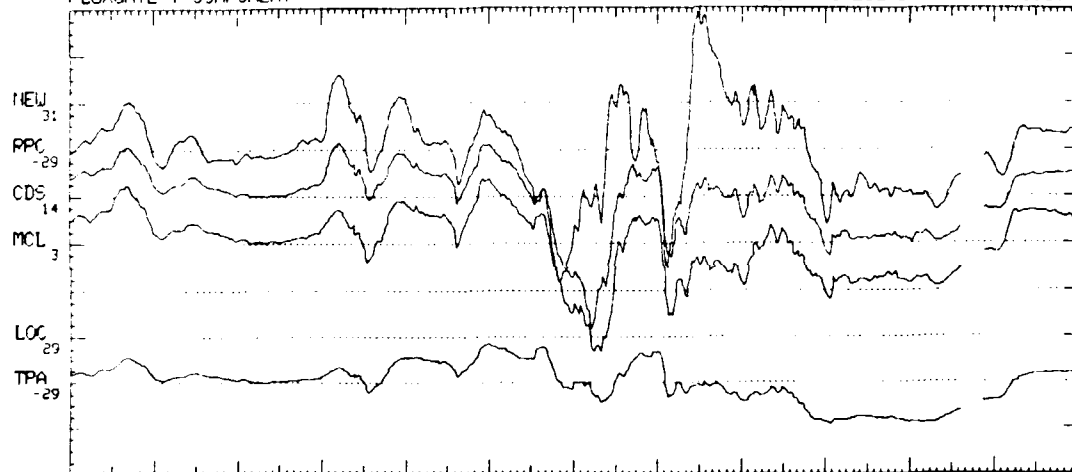
FLUXGATE X COMPONENT

40 NANOTESLAS/MAJOR DIVISION



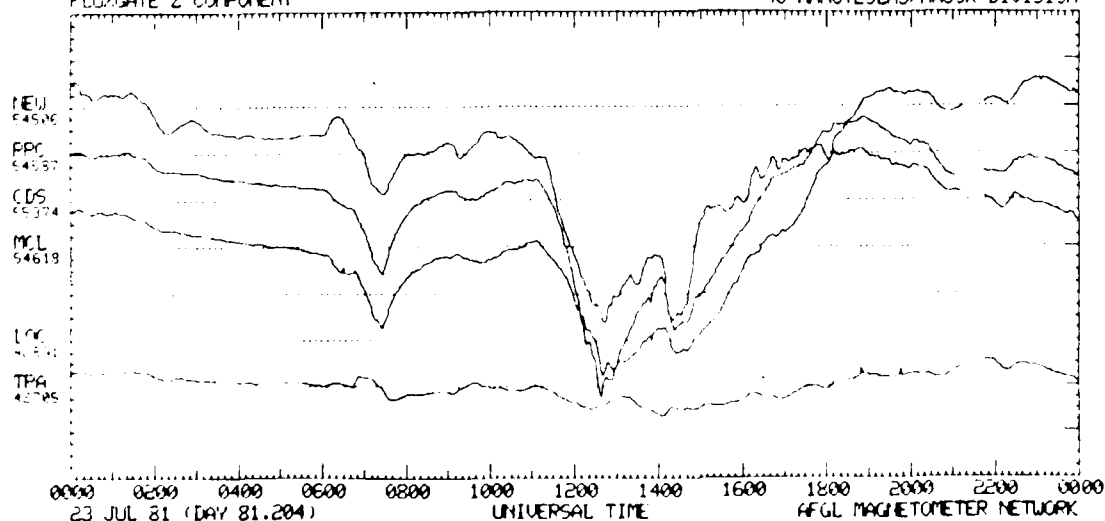
FLUXGATE Y COMPONENT

40 NANOTESLAS/MAJOR DIVISION

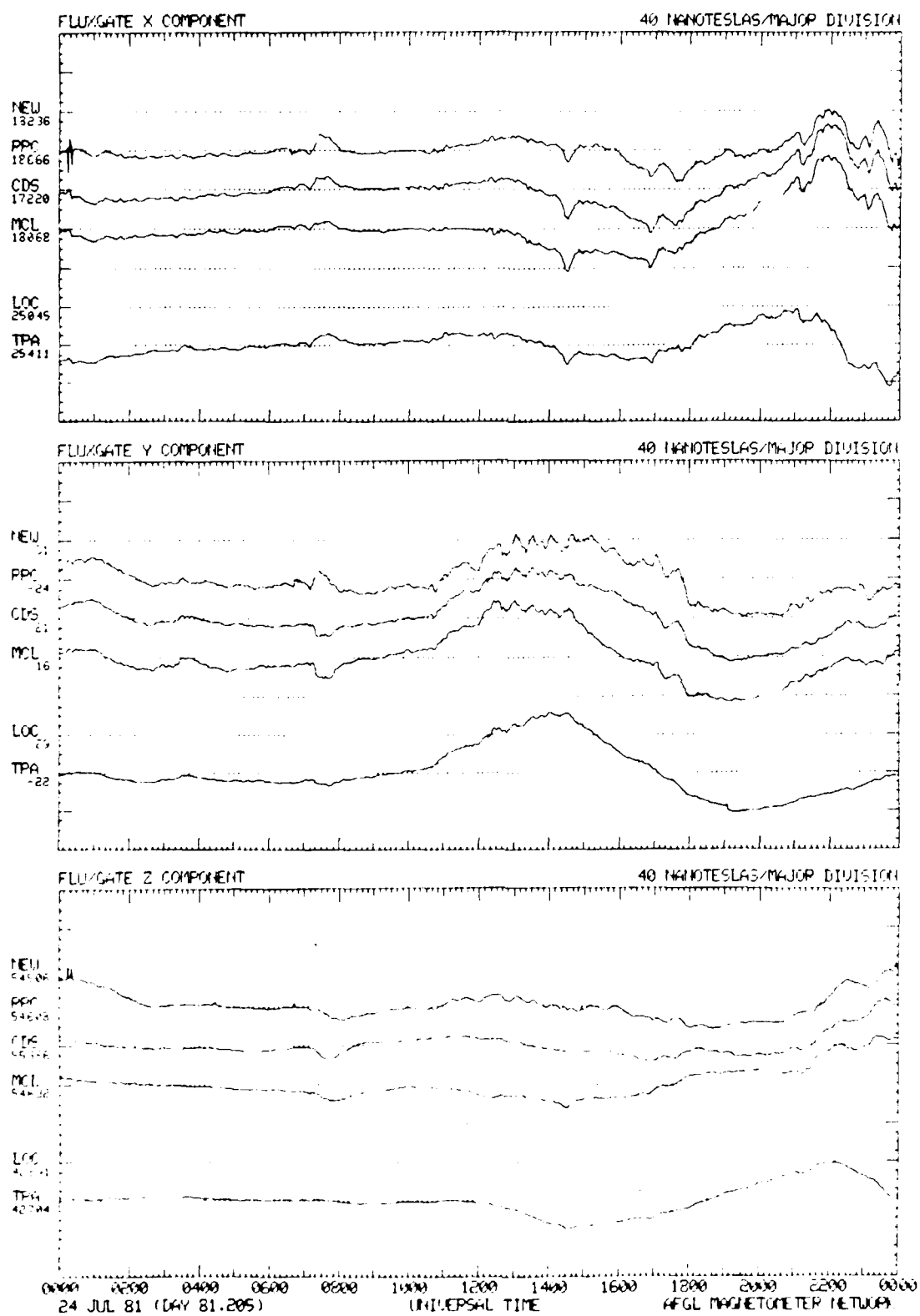


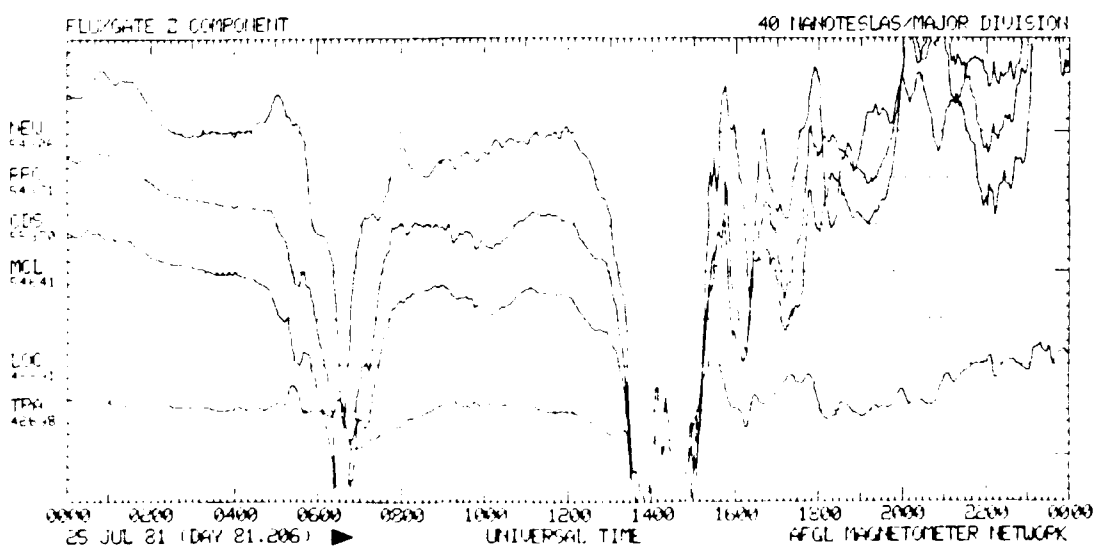
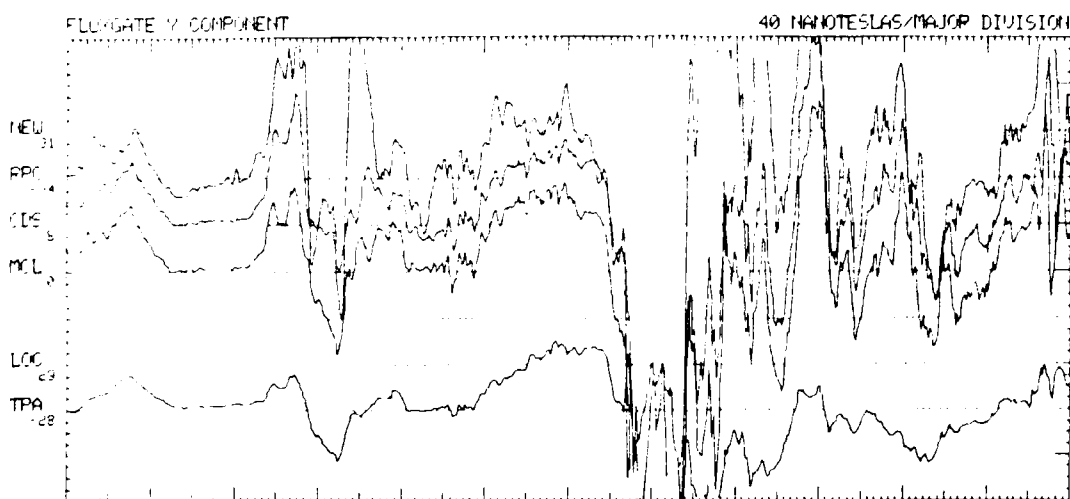
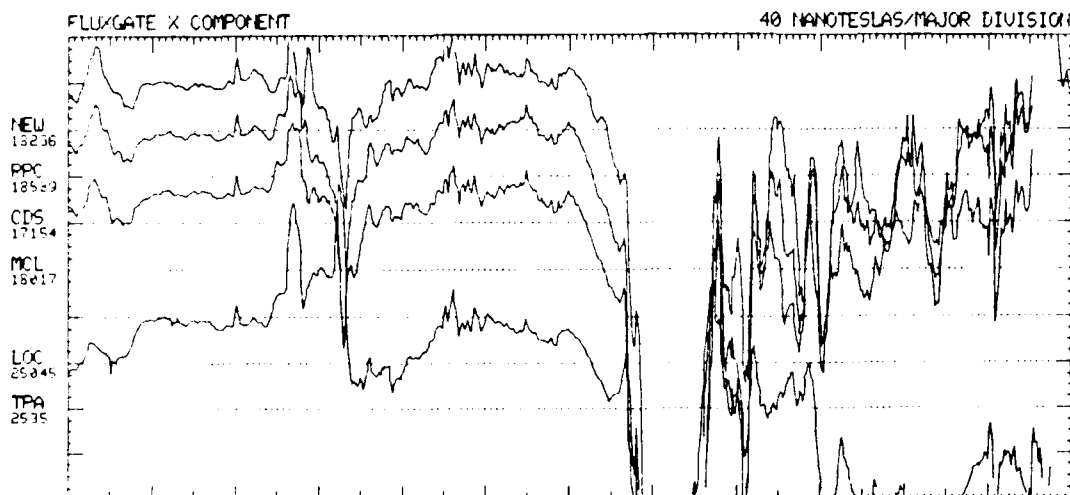
FLUXGATE Z COMPONENT

40 NANOTESLAS/MAJOR DIVISION

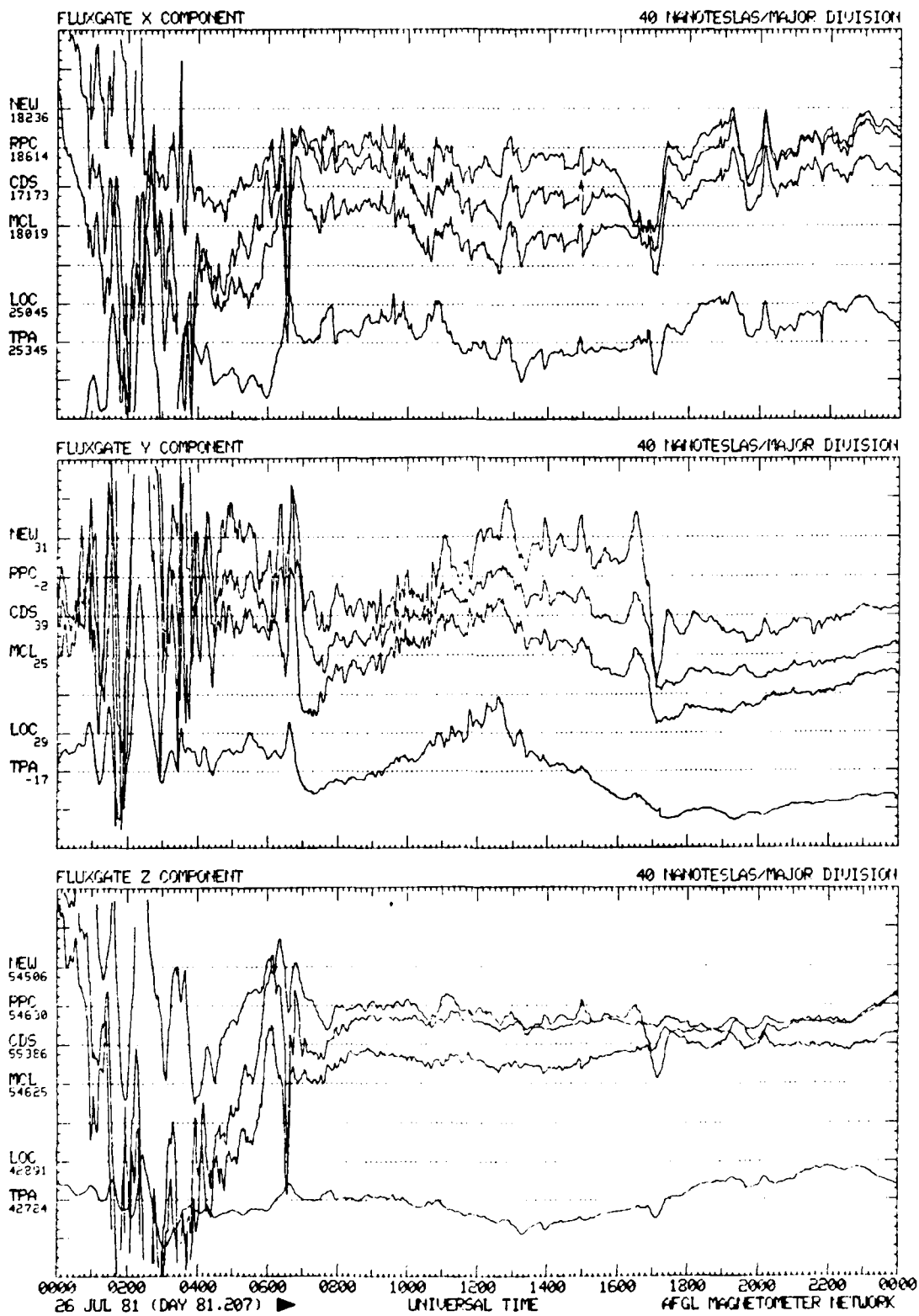


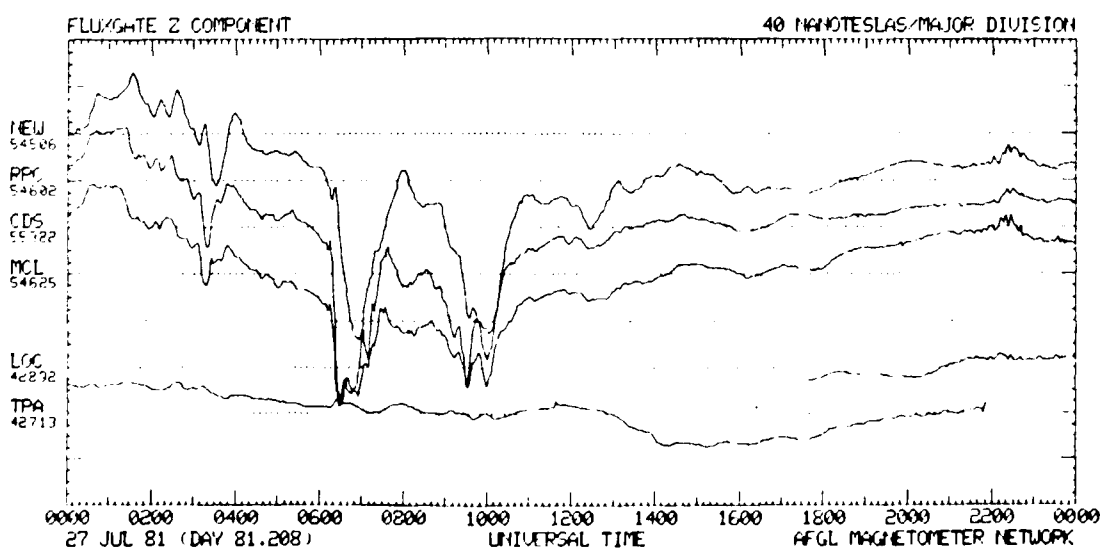
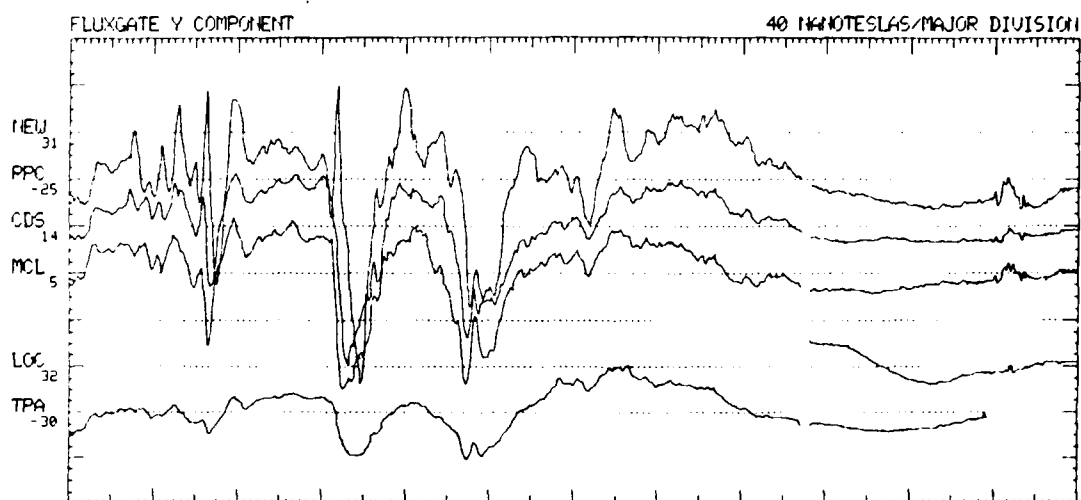
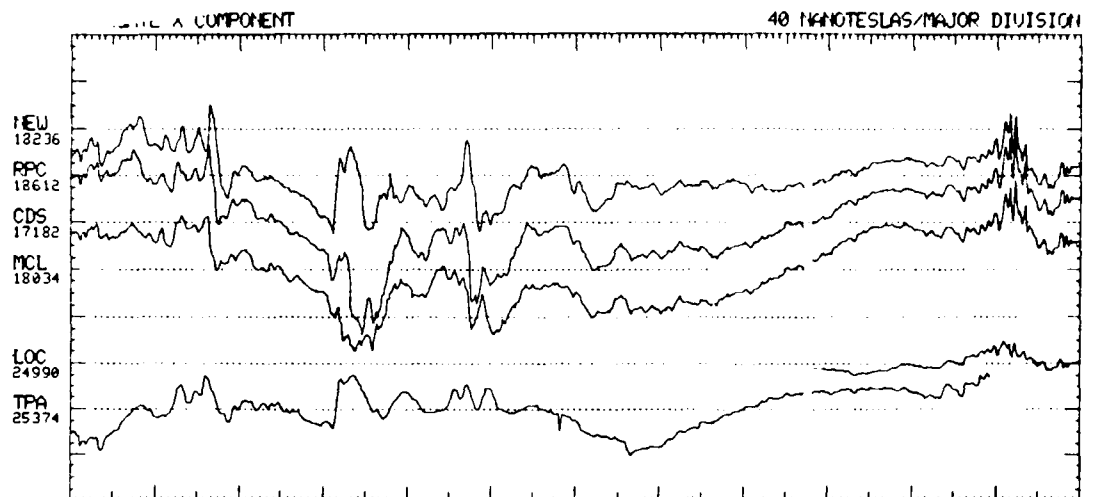
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23 JUL 81 (DAY 81.204) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

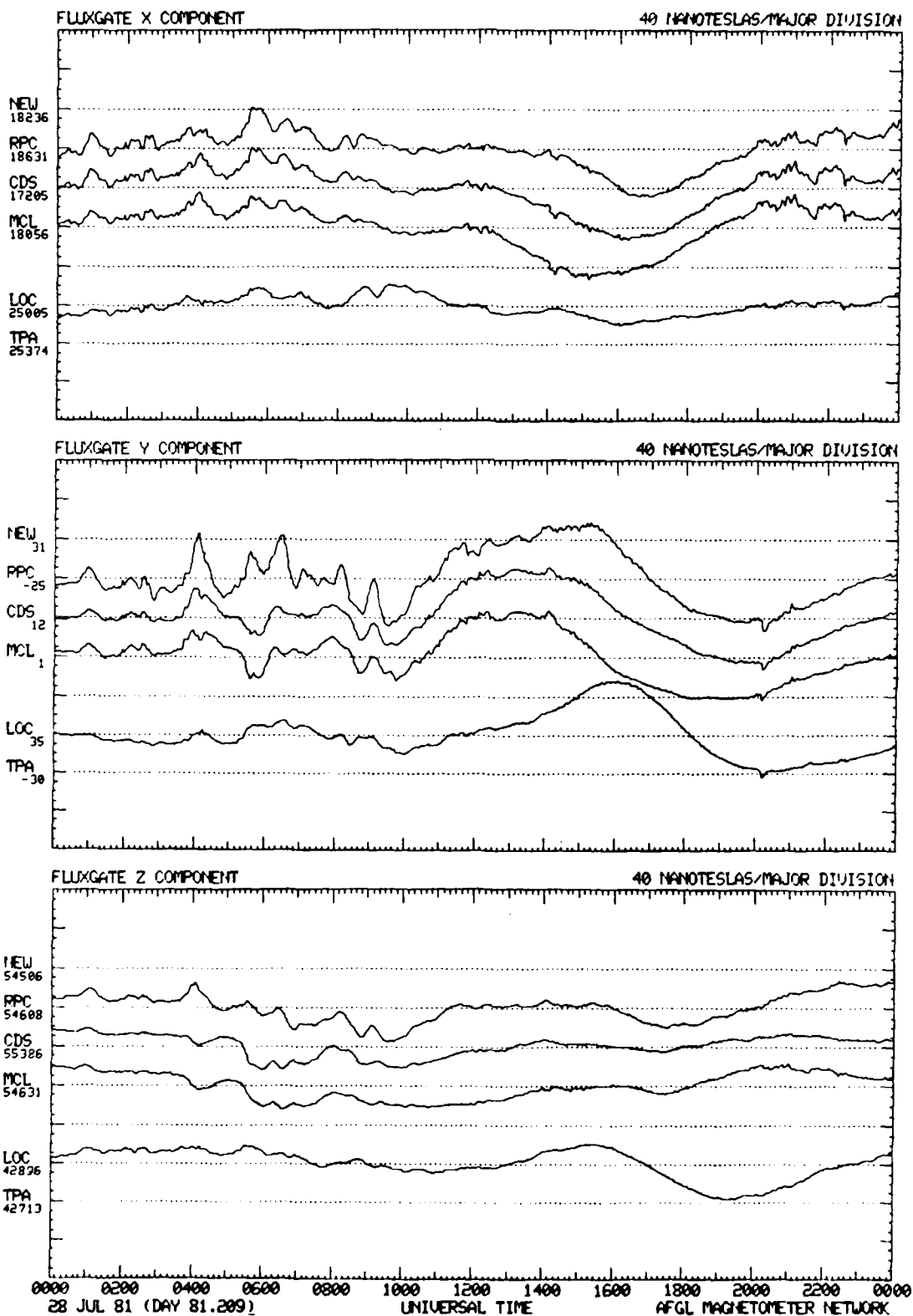


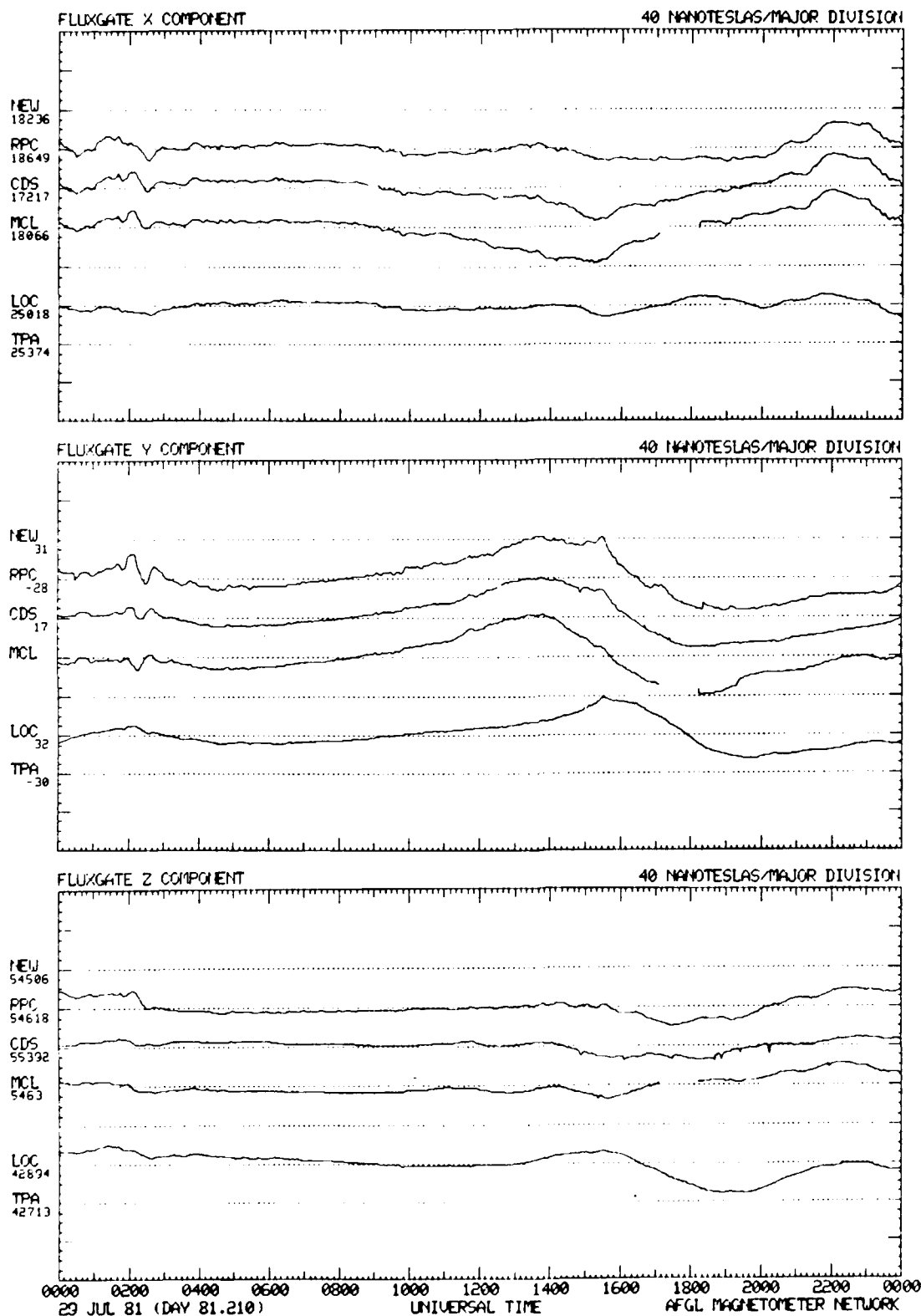


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25 JUL 81 (DAY 21.206) ▶ UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

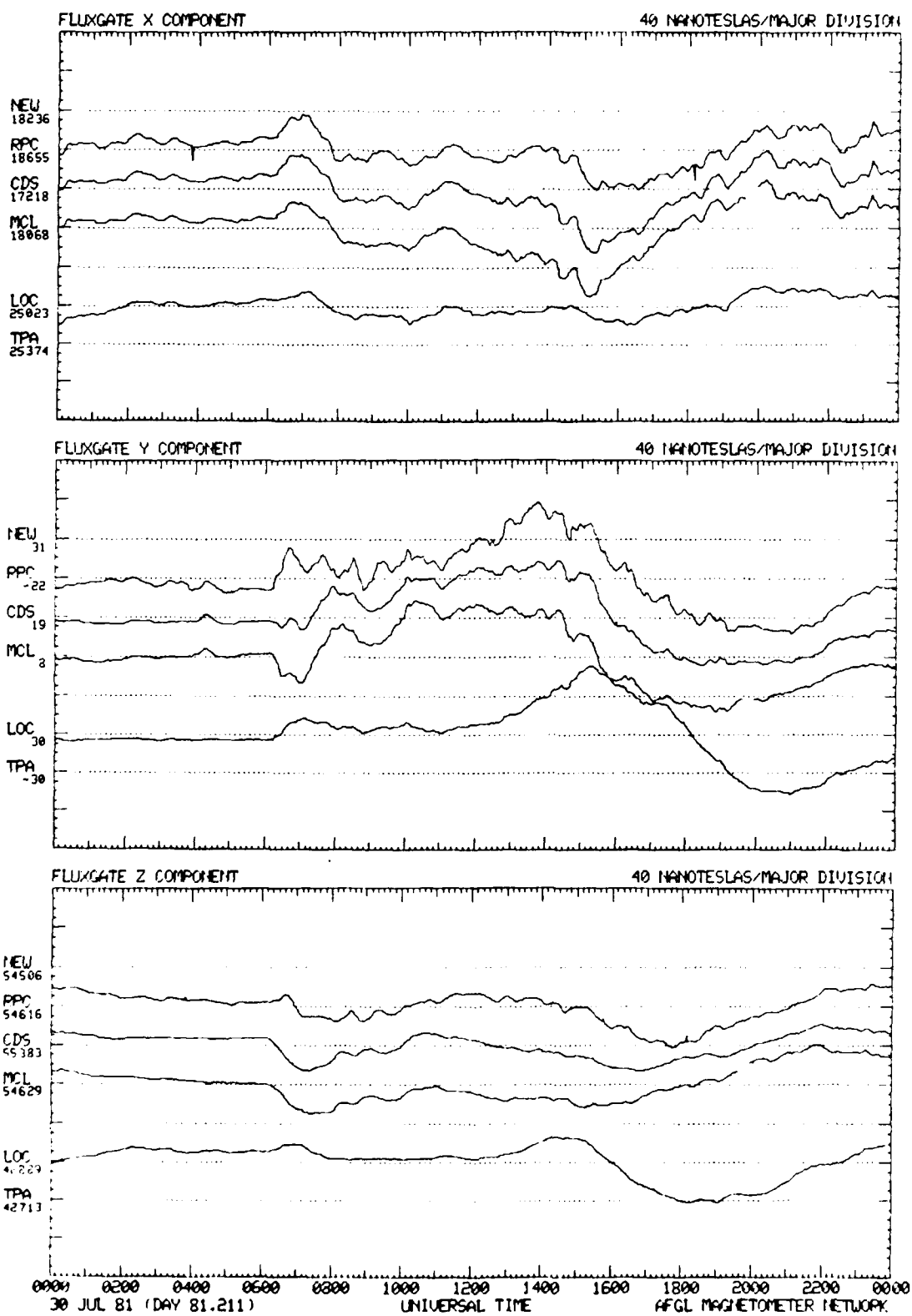


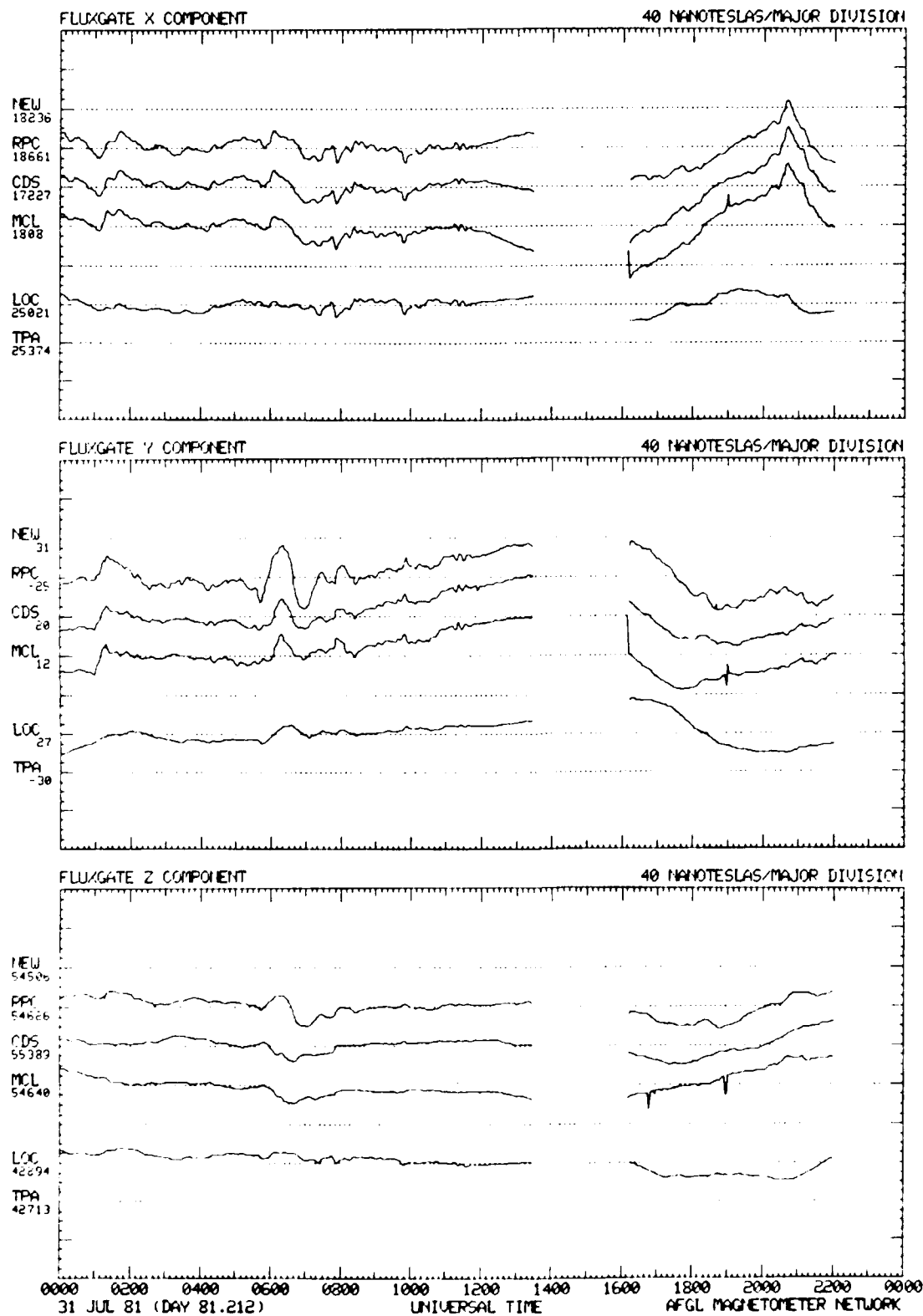


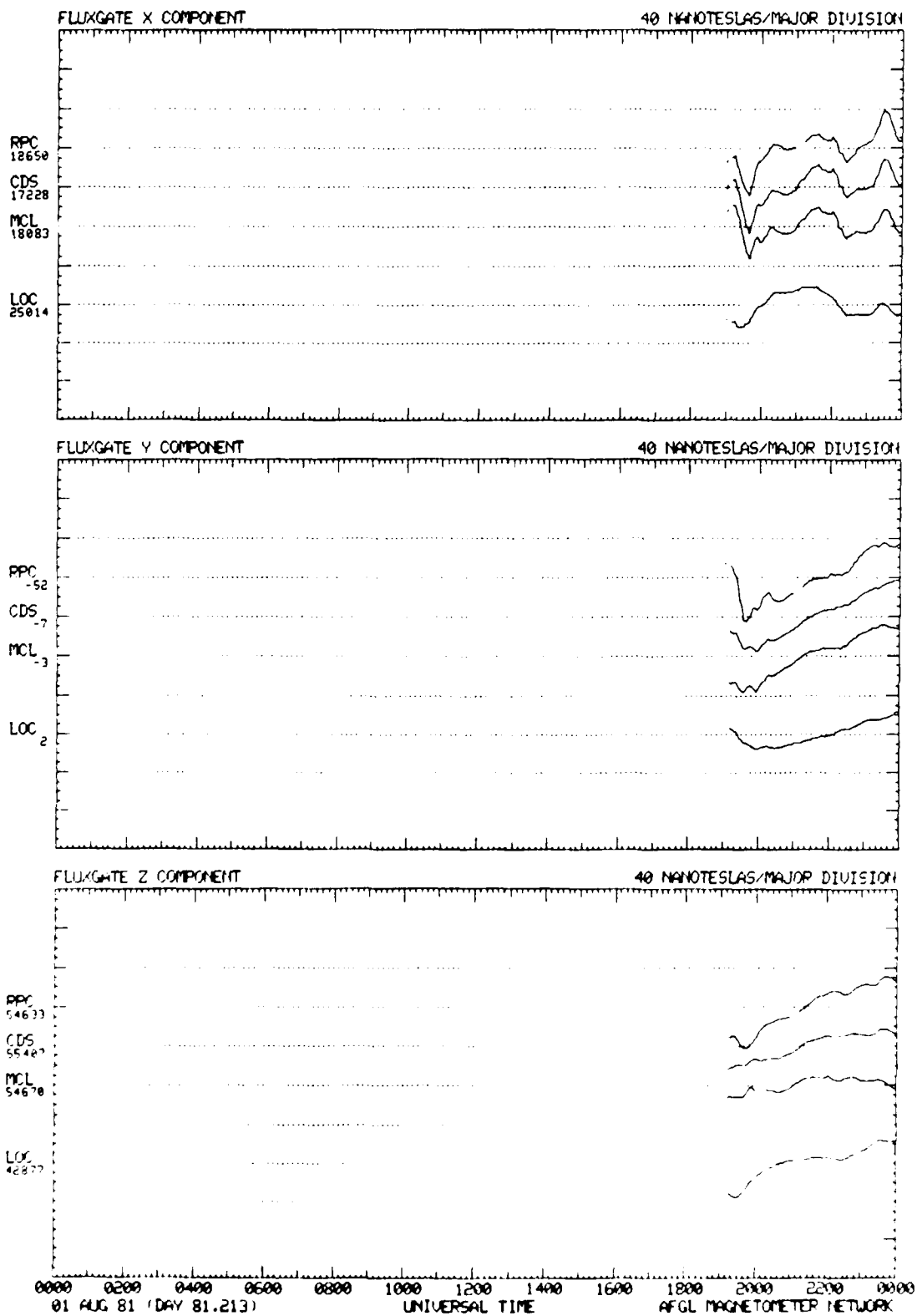


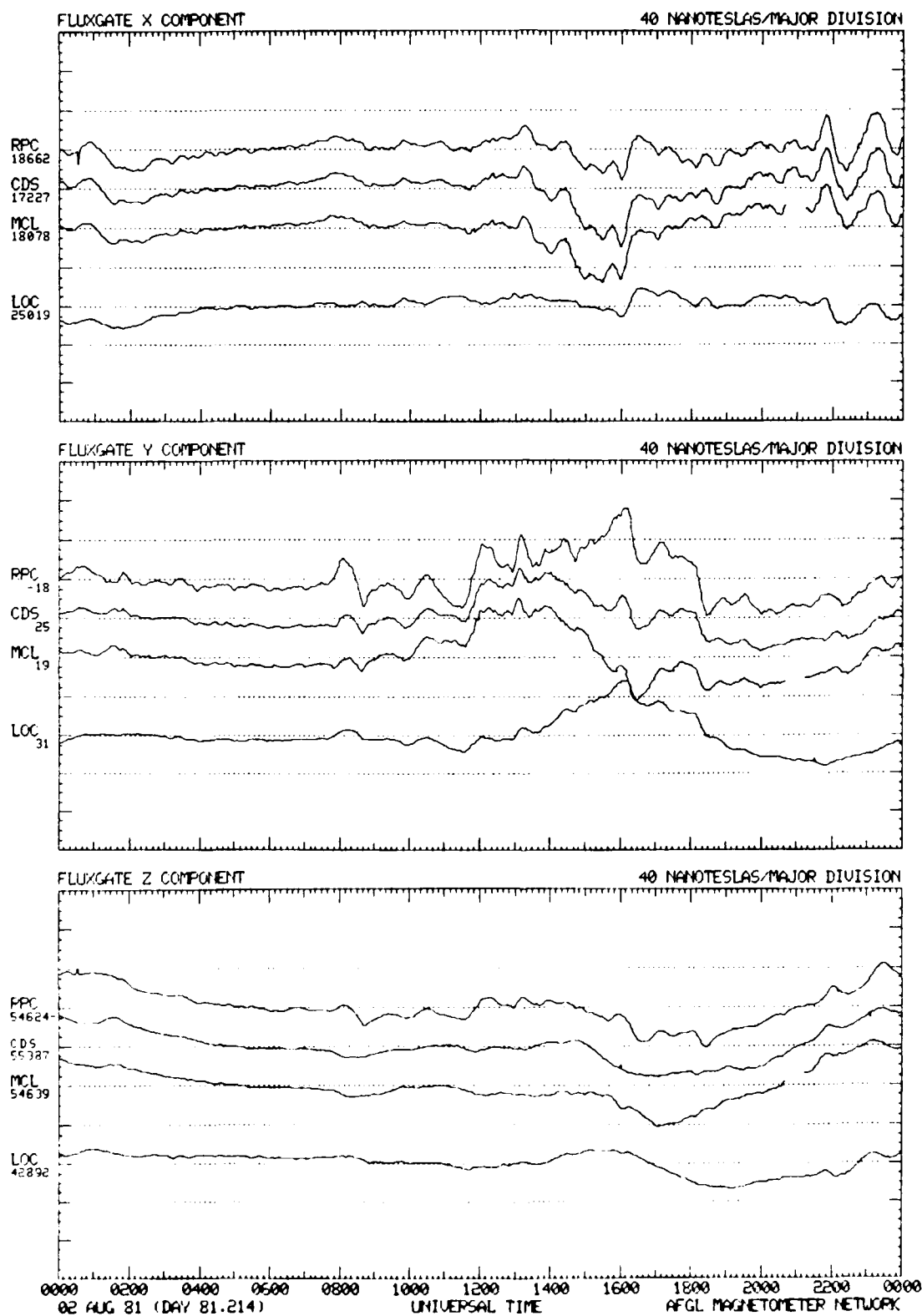


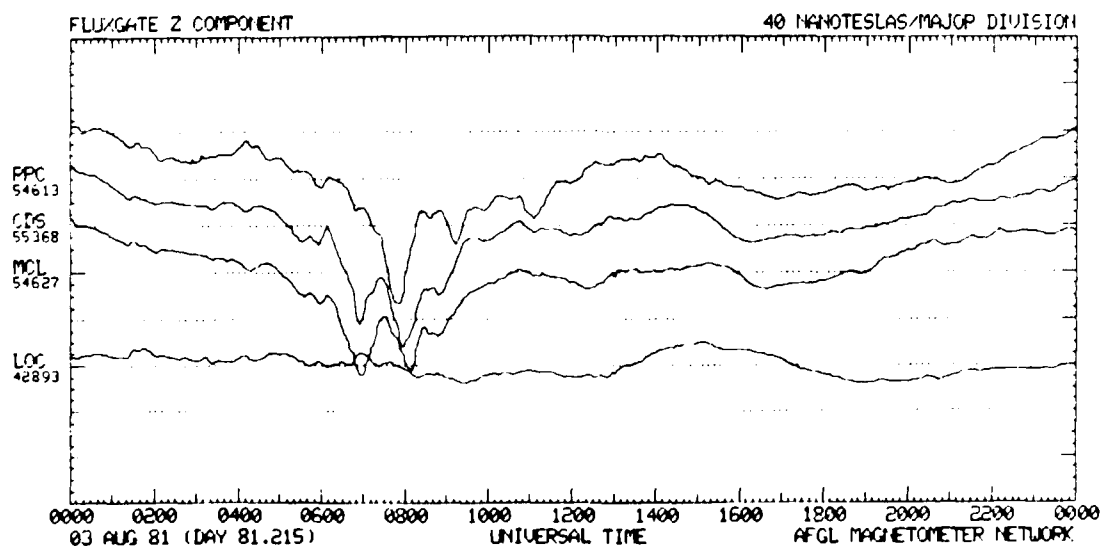
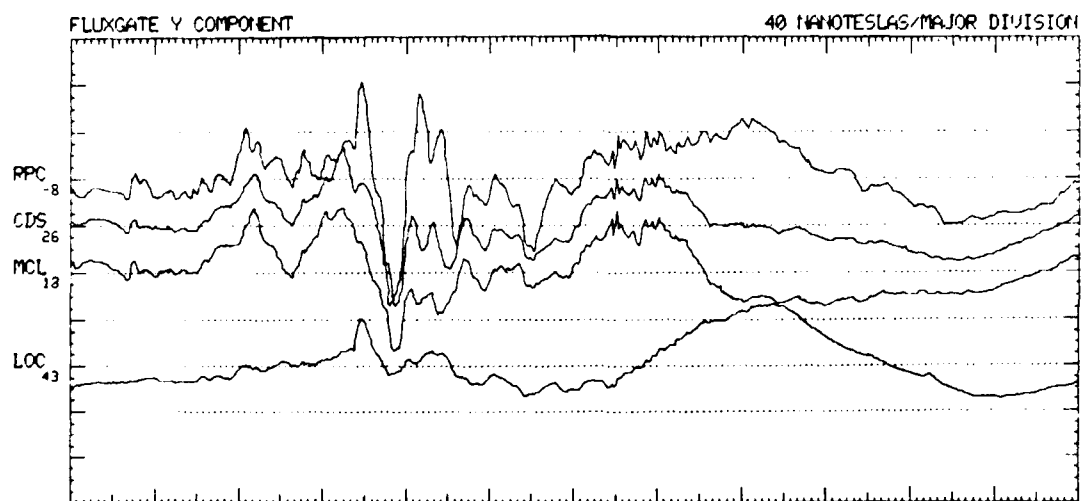
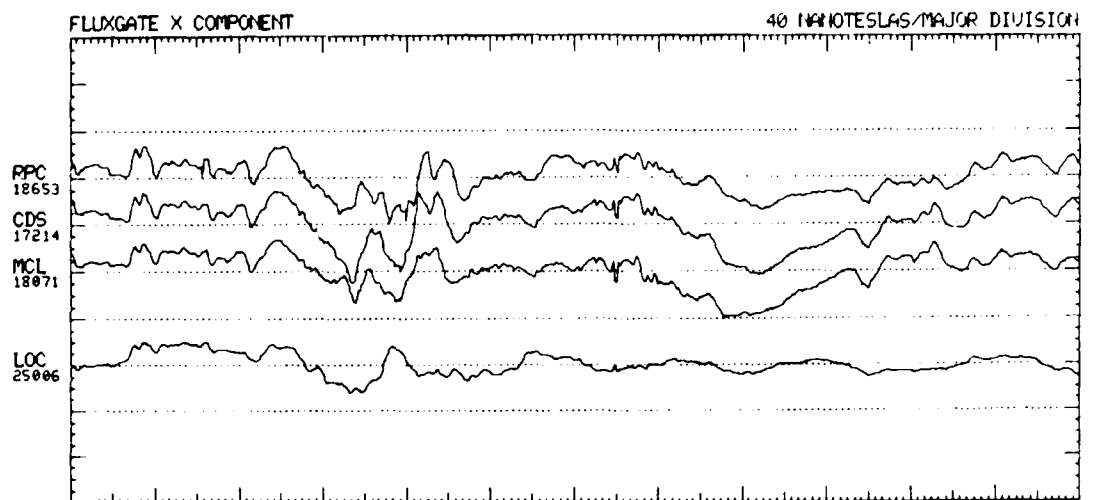


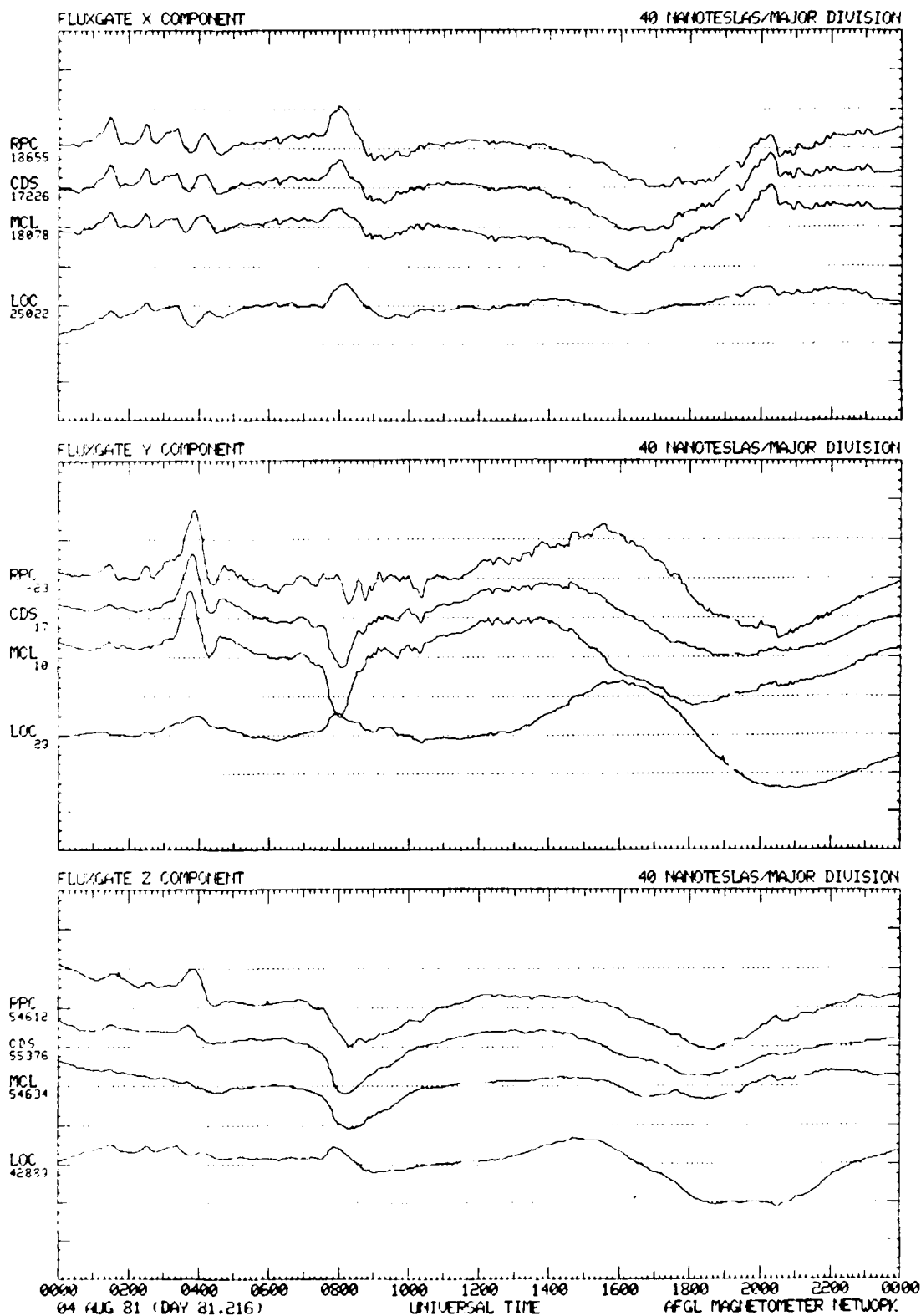


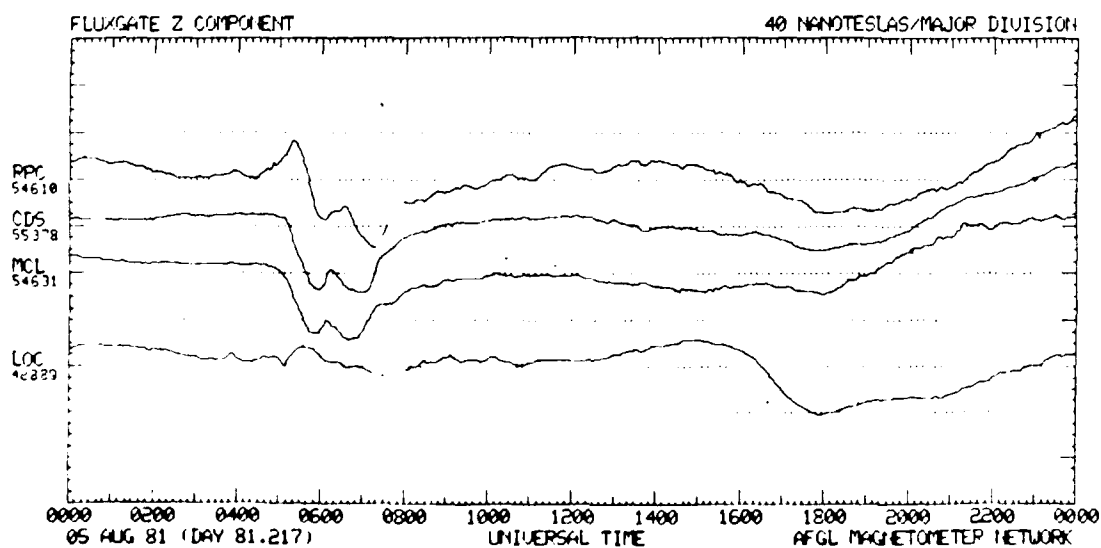
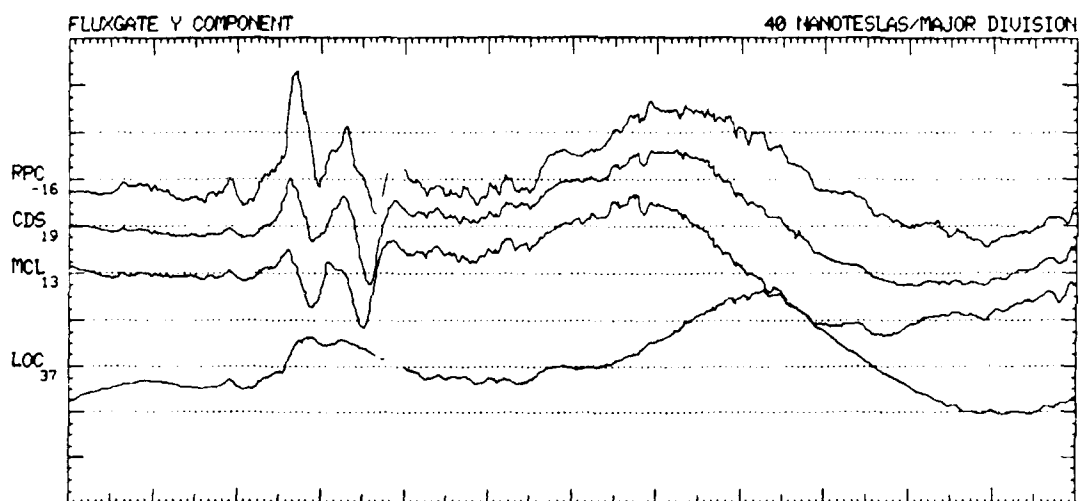
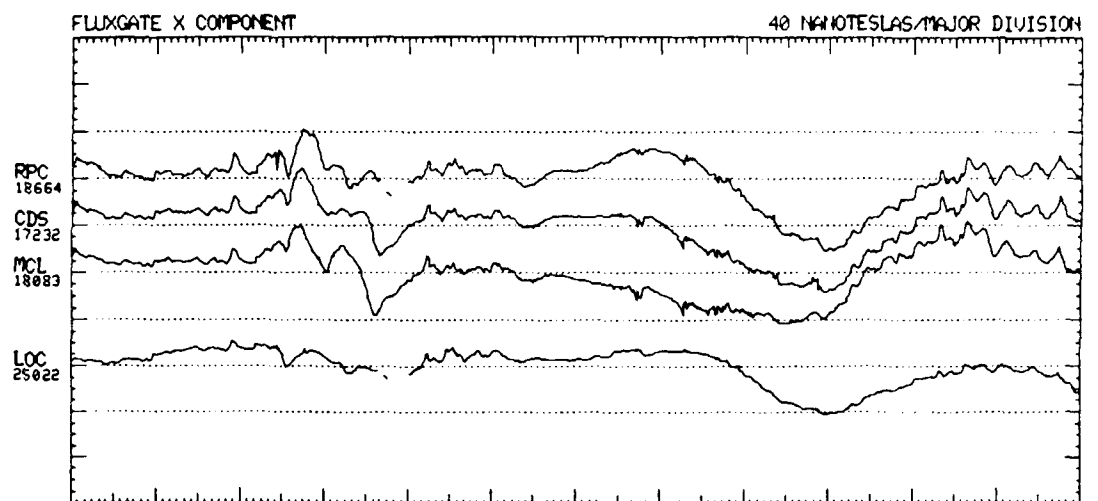


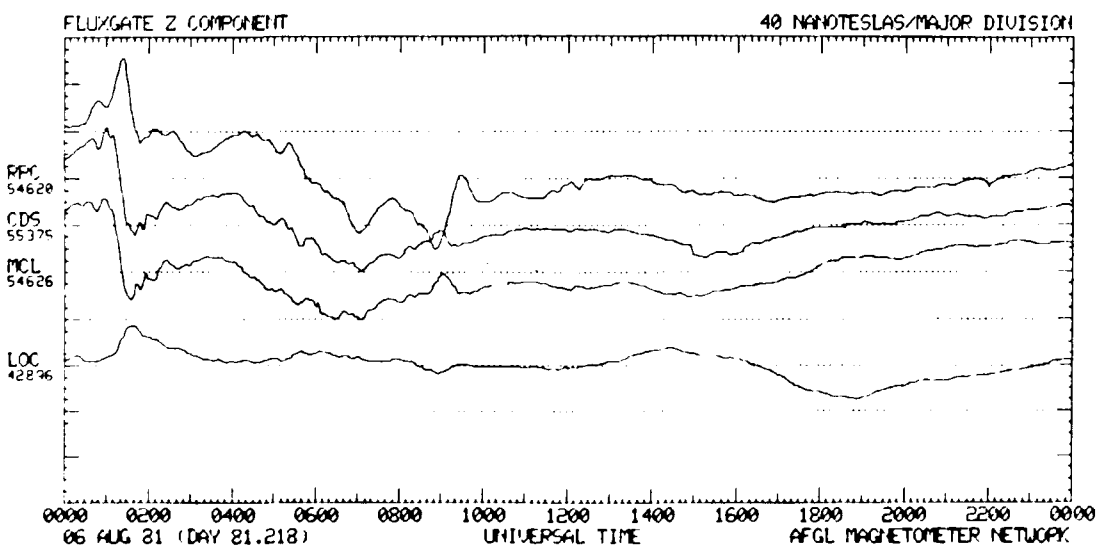
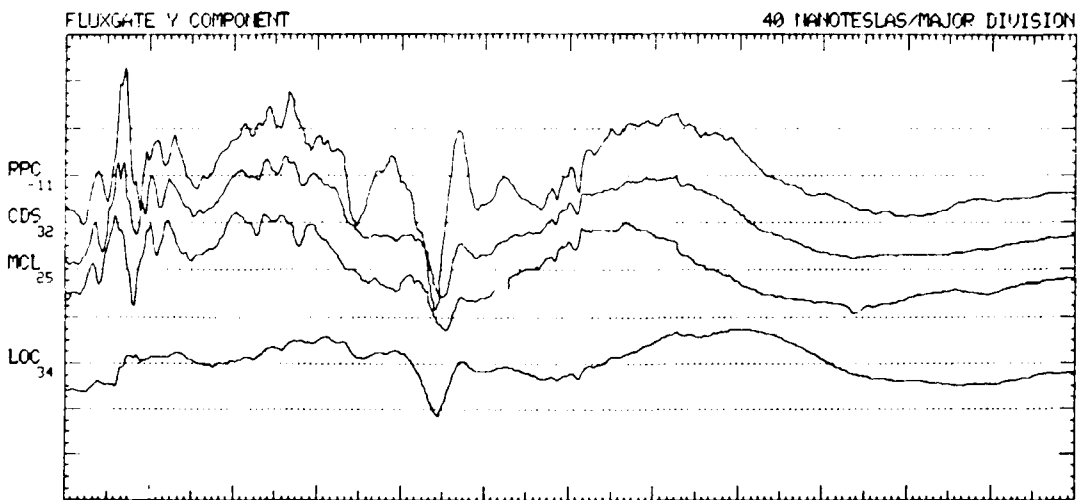
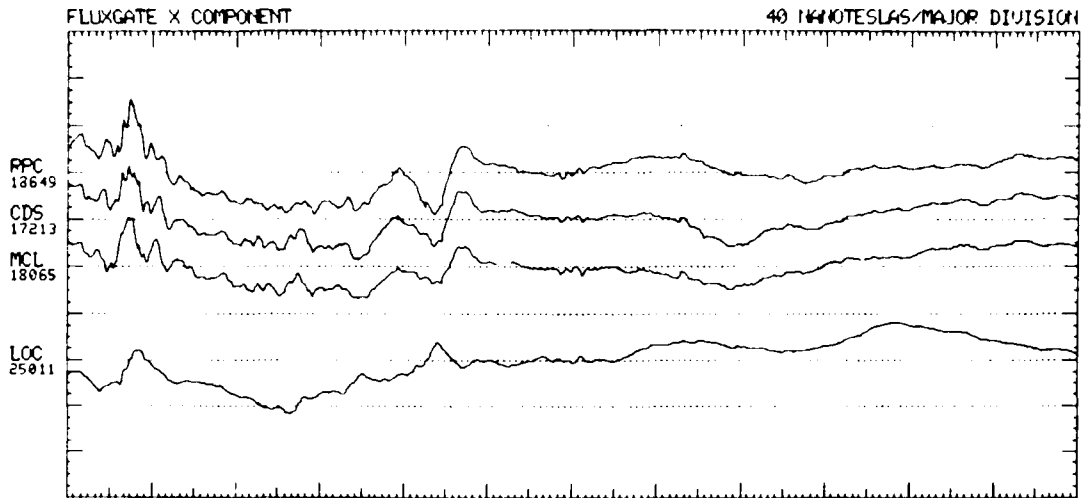




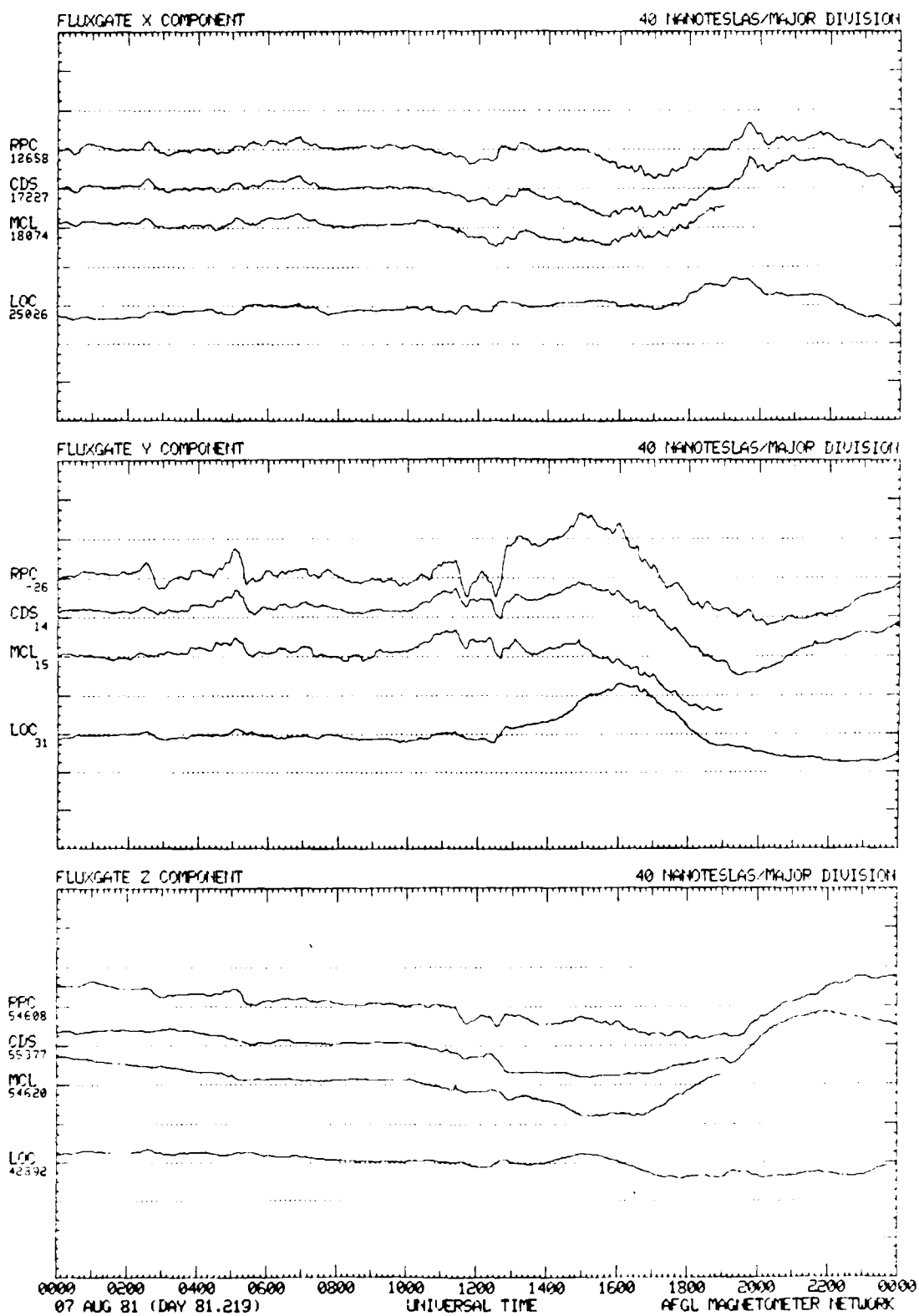


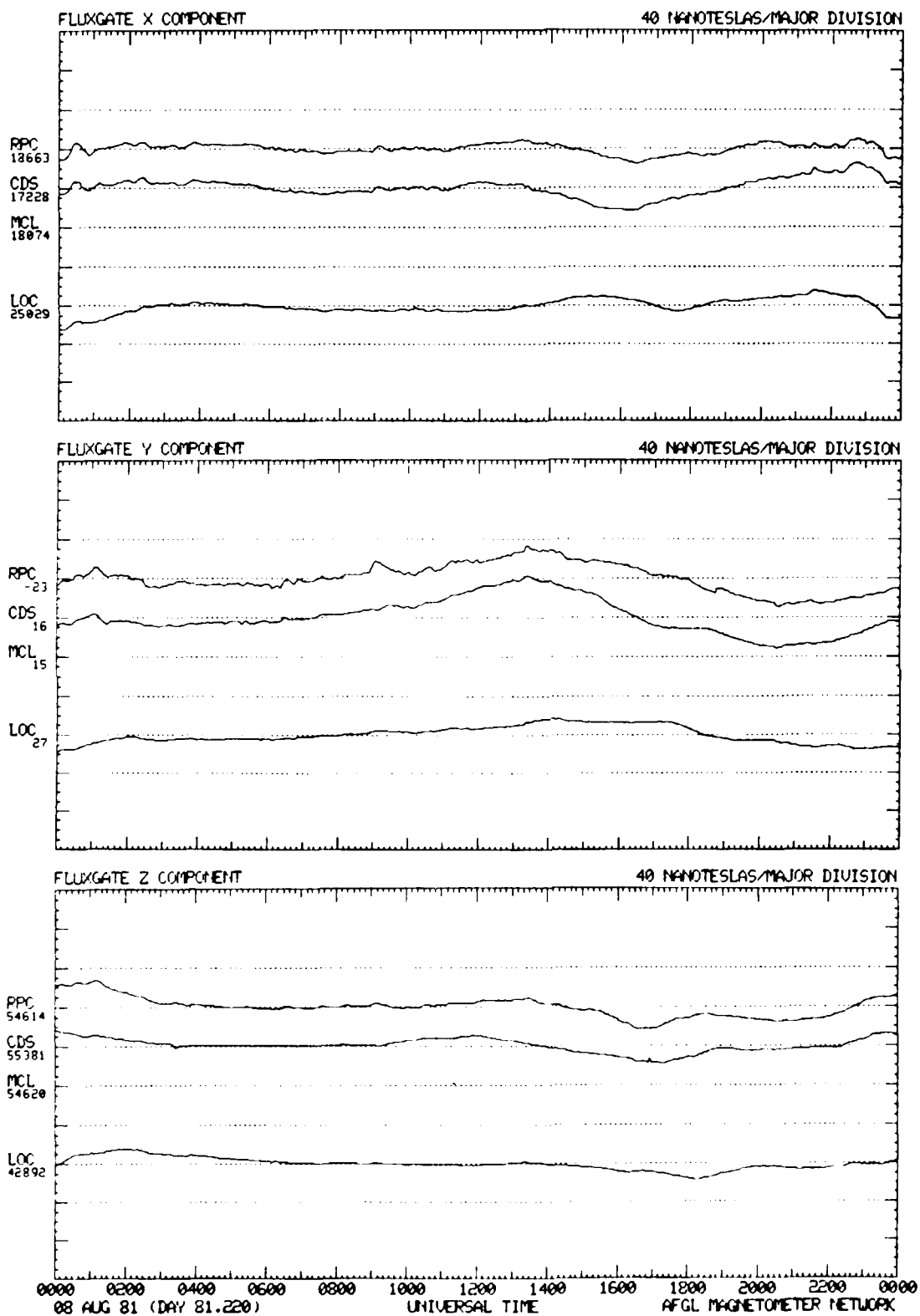


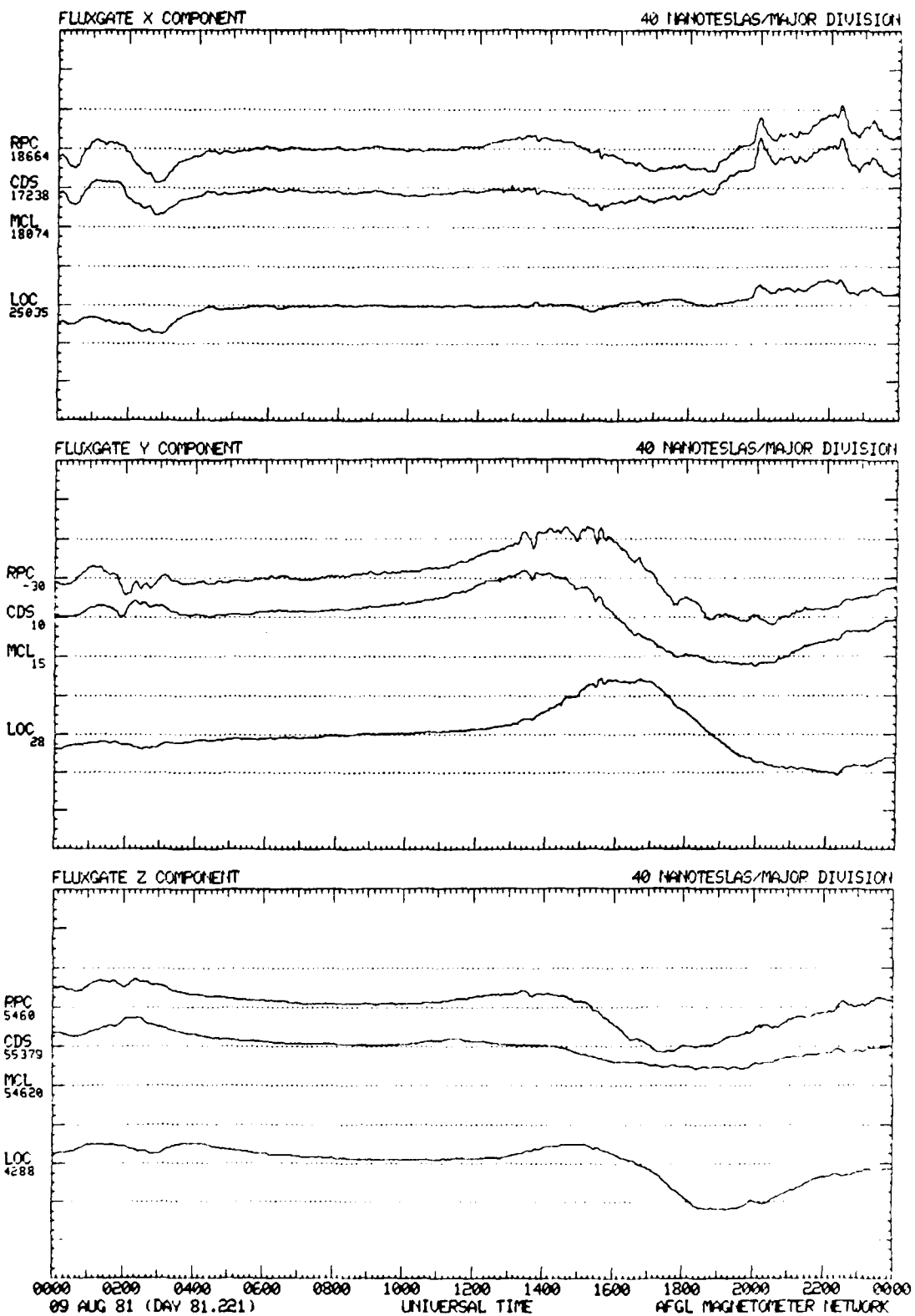


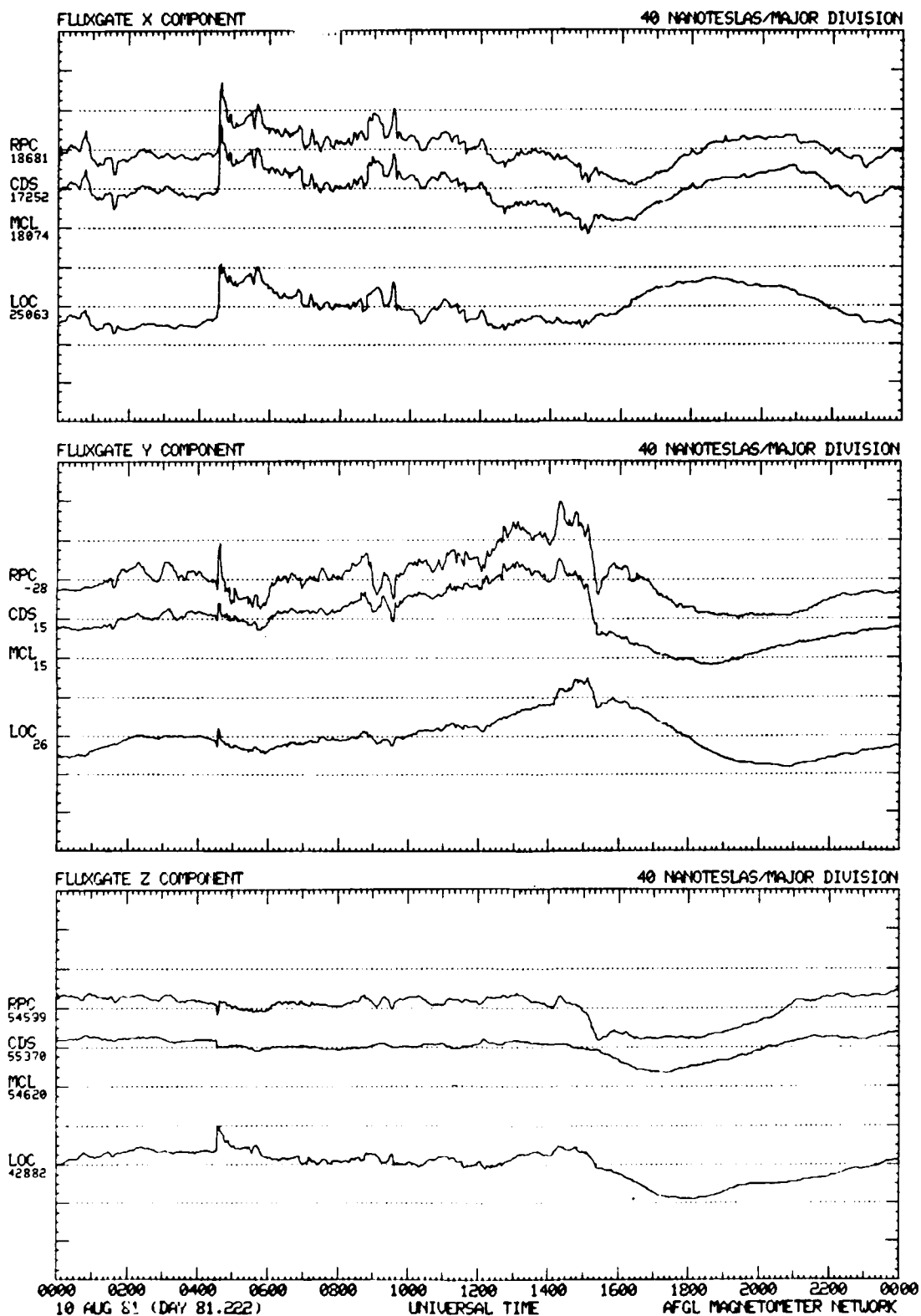


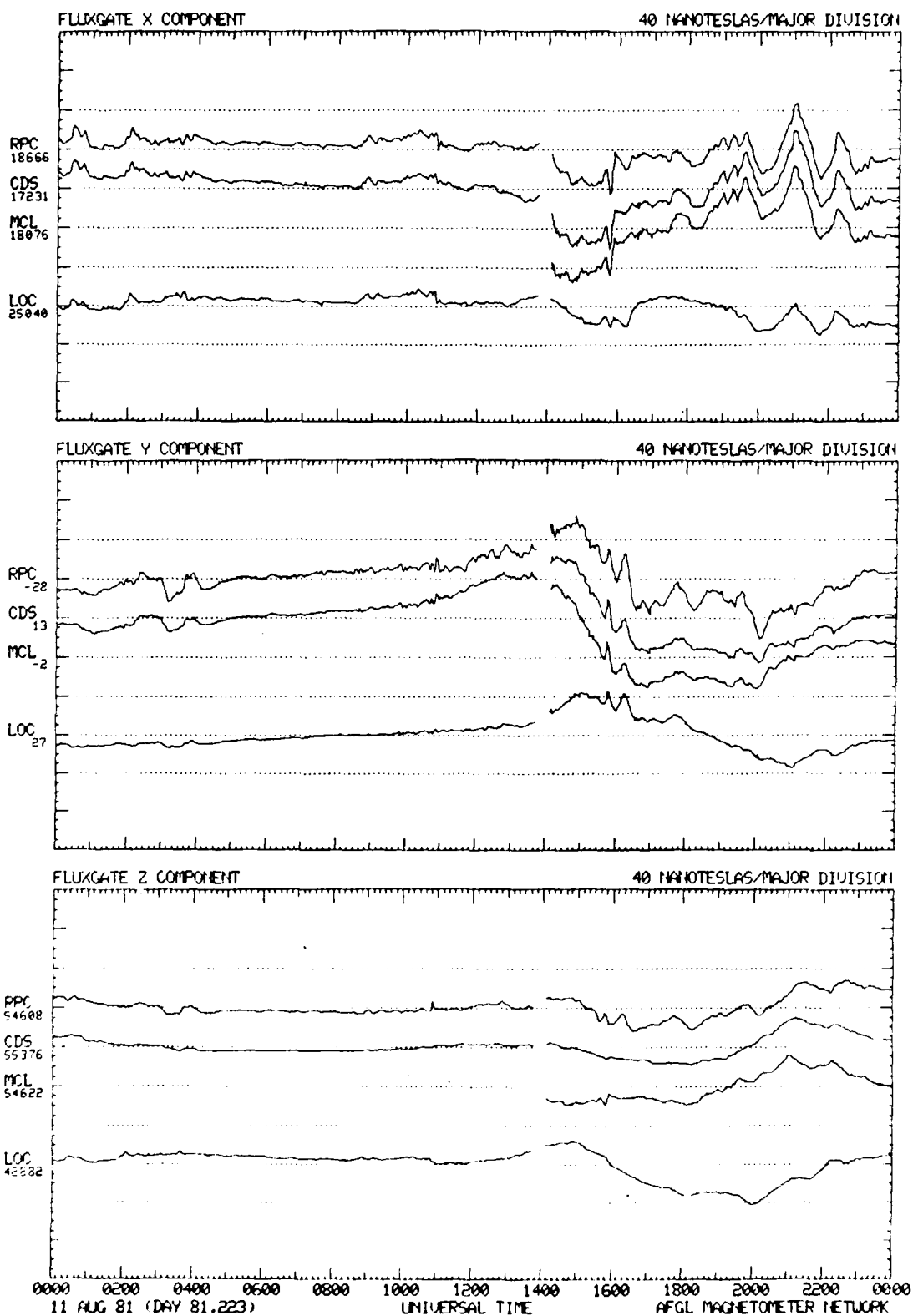


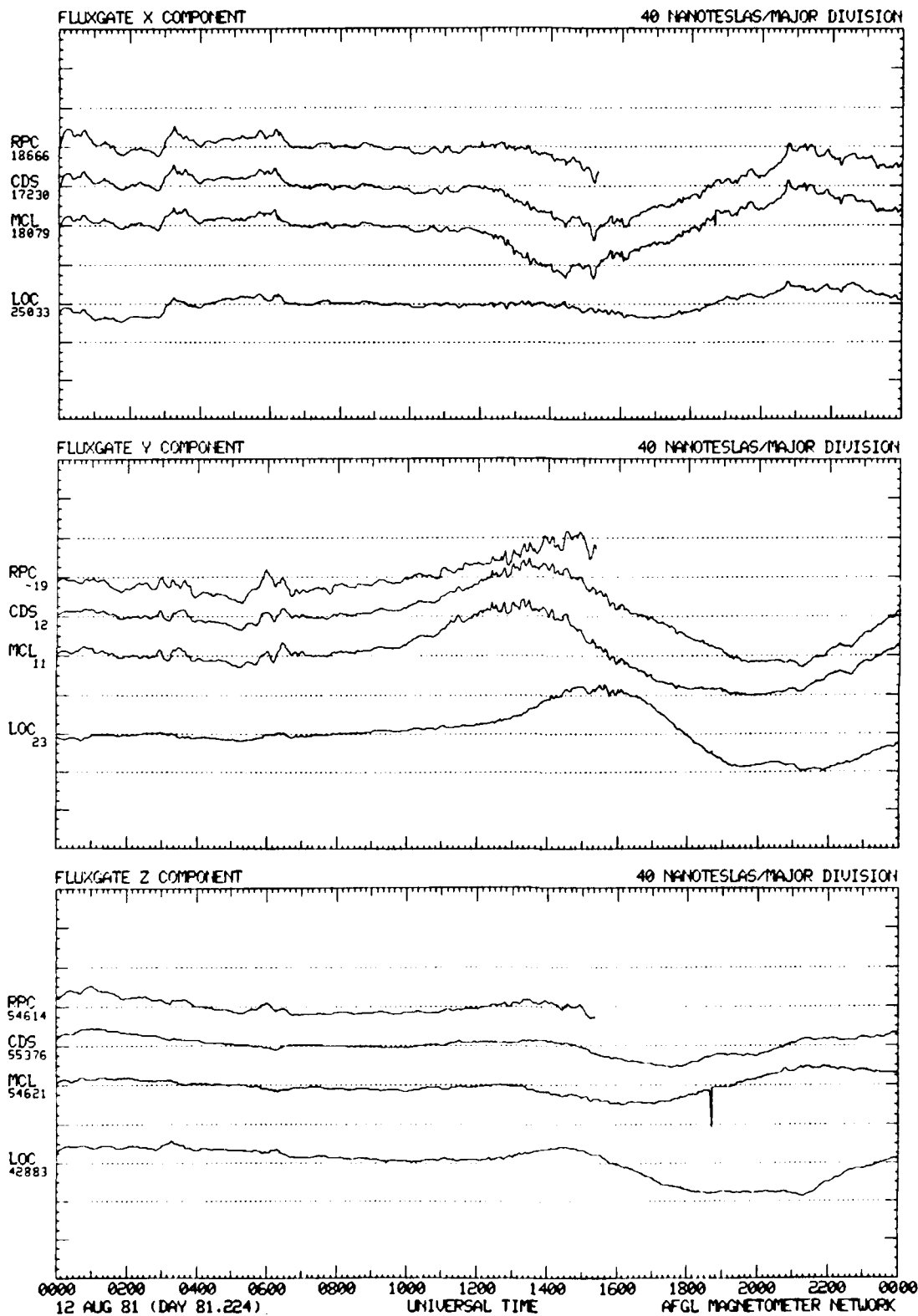


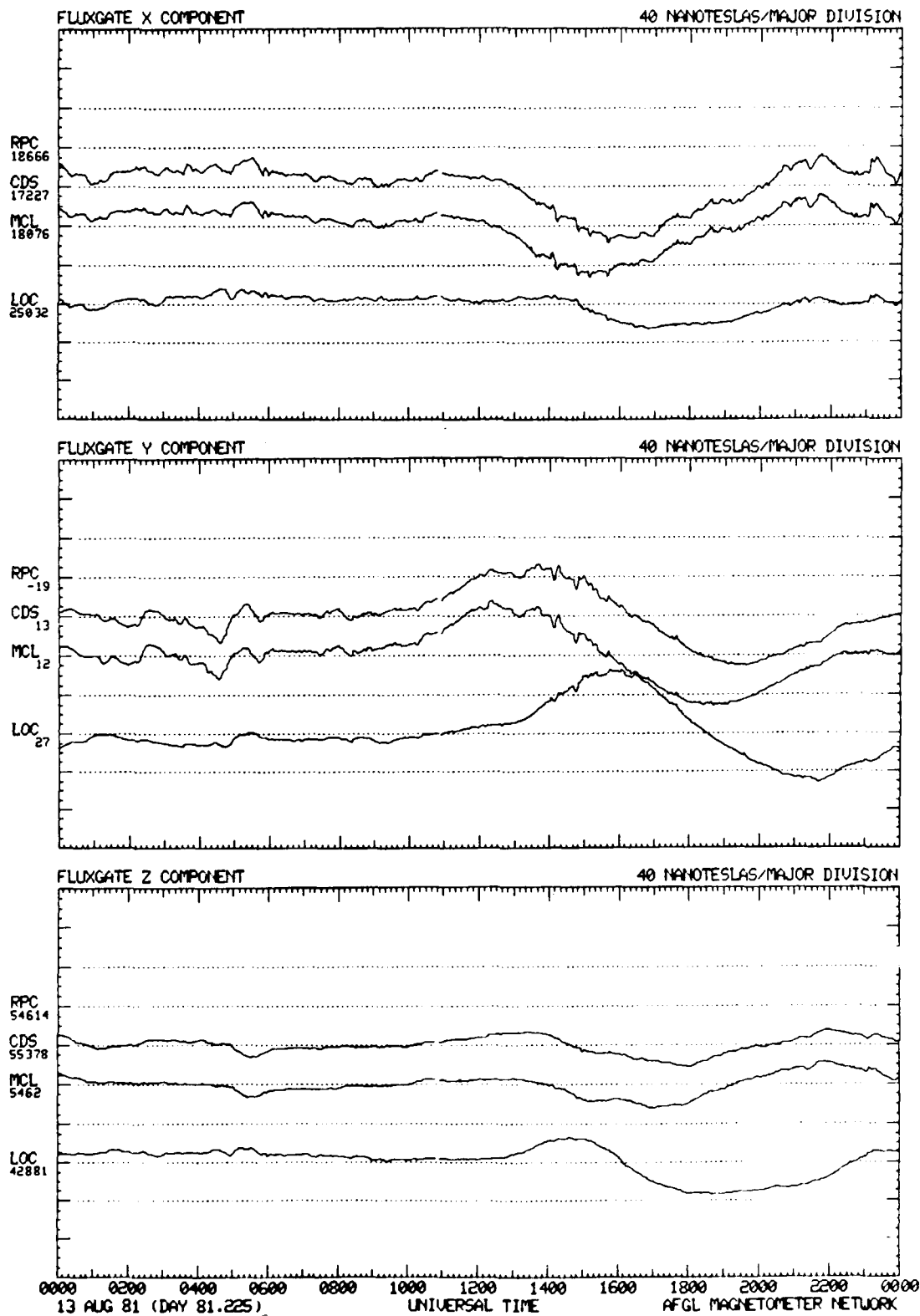


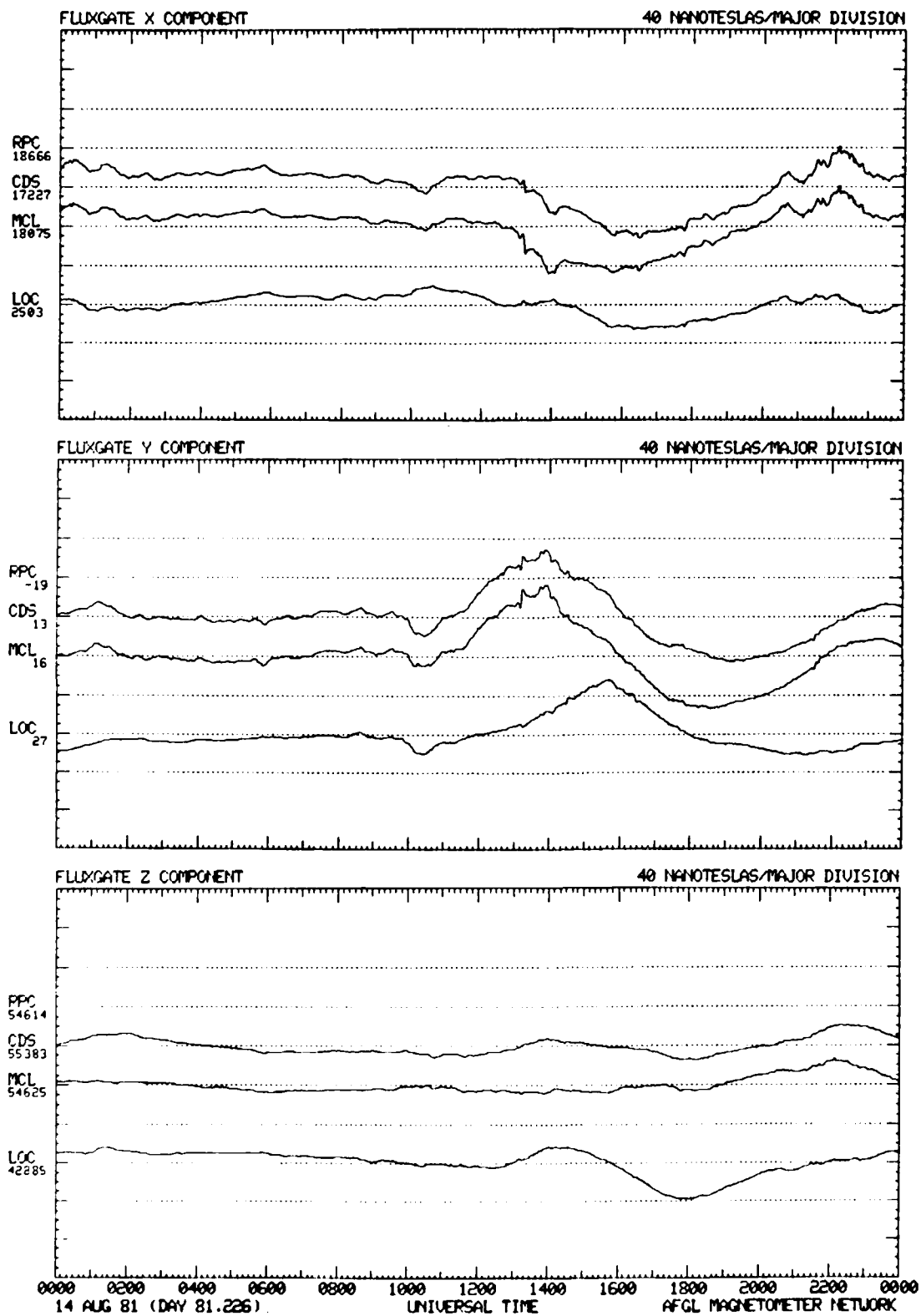




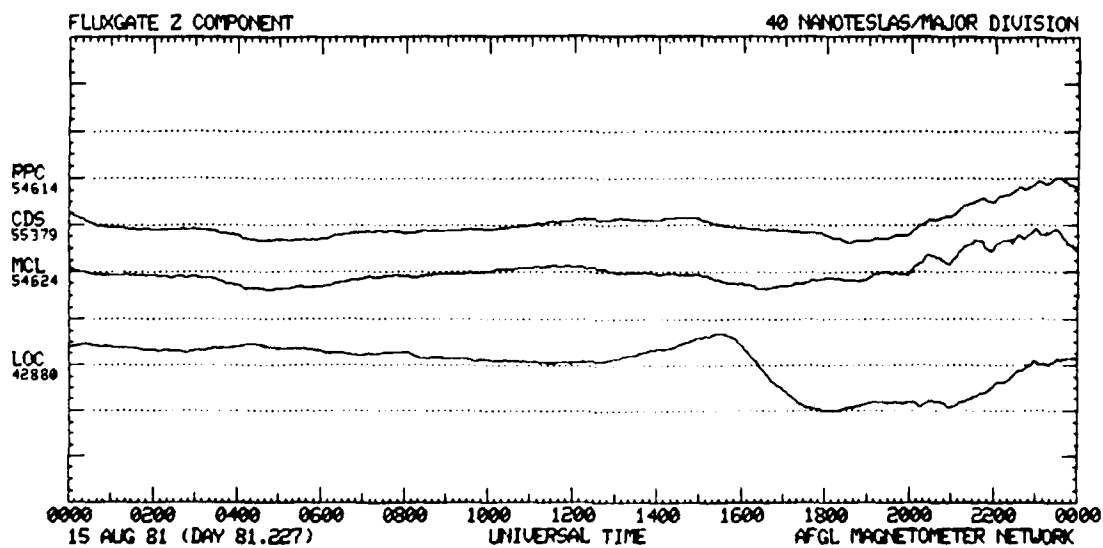
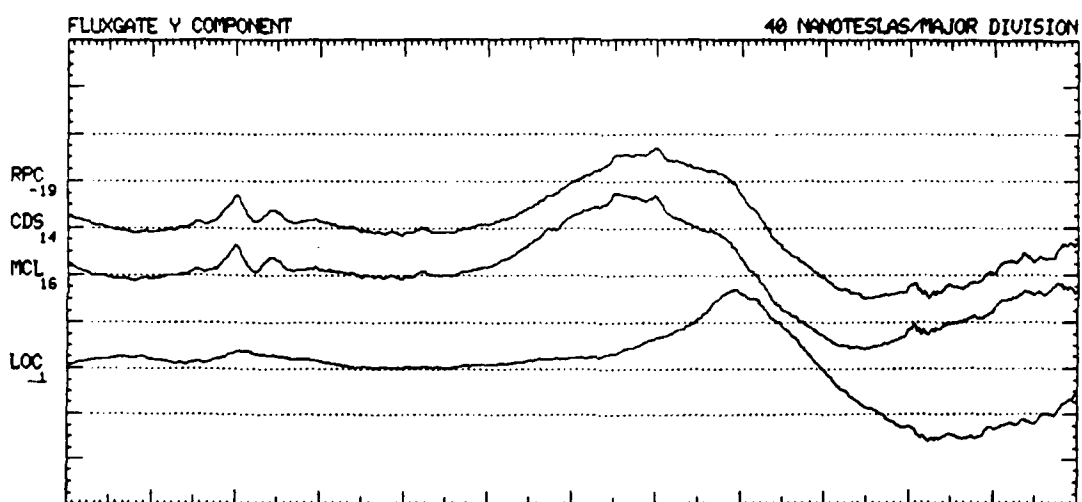
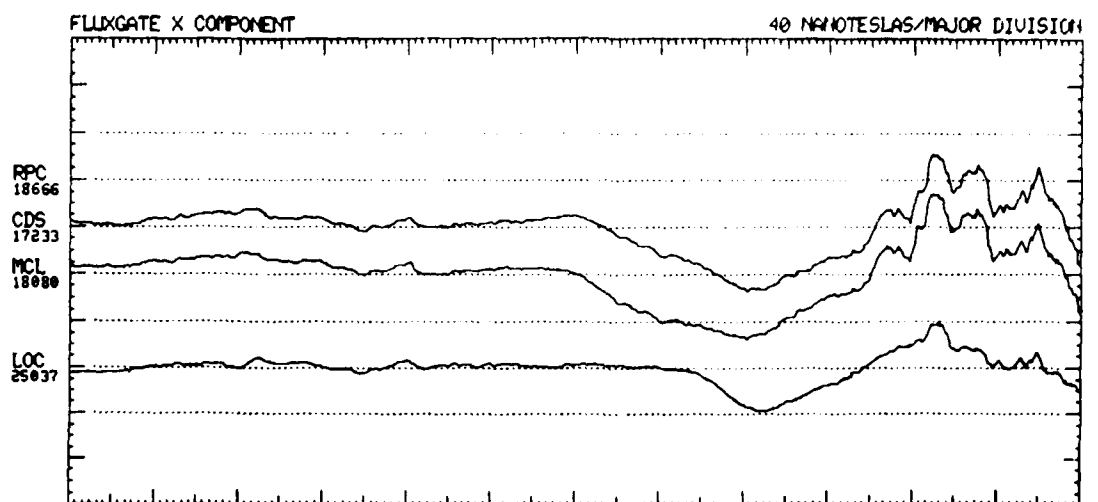


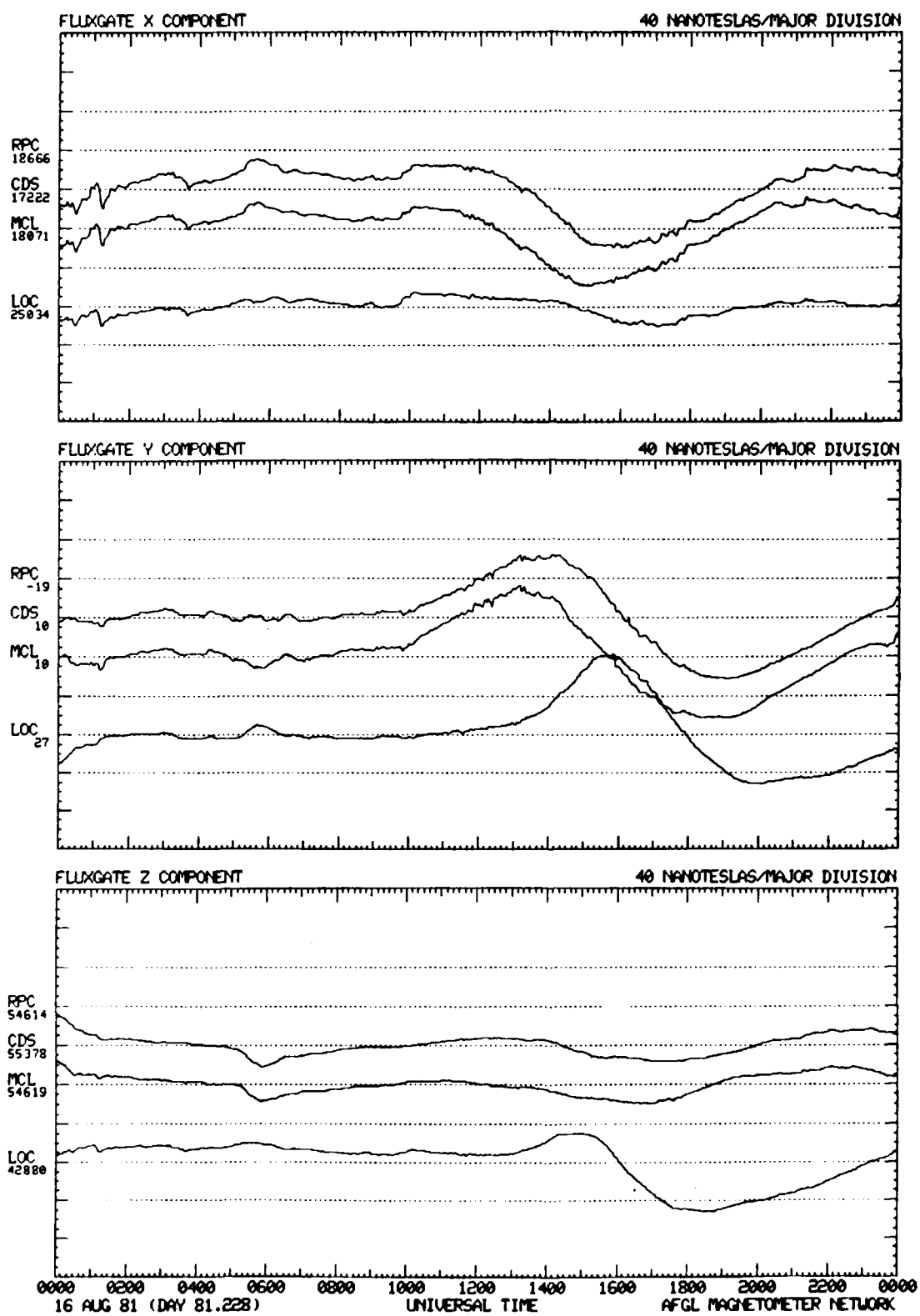


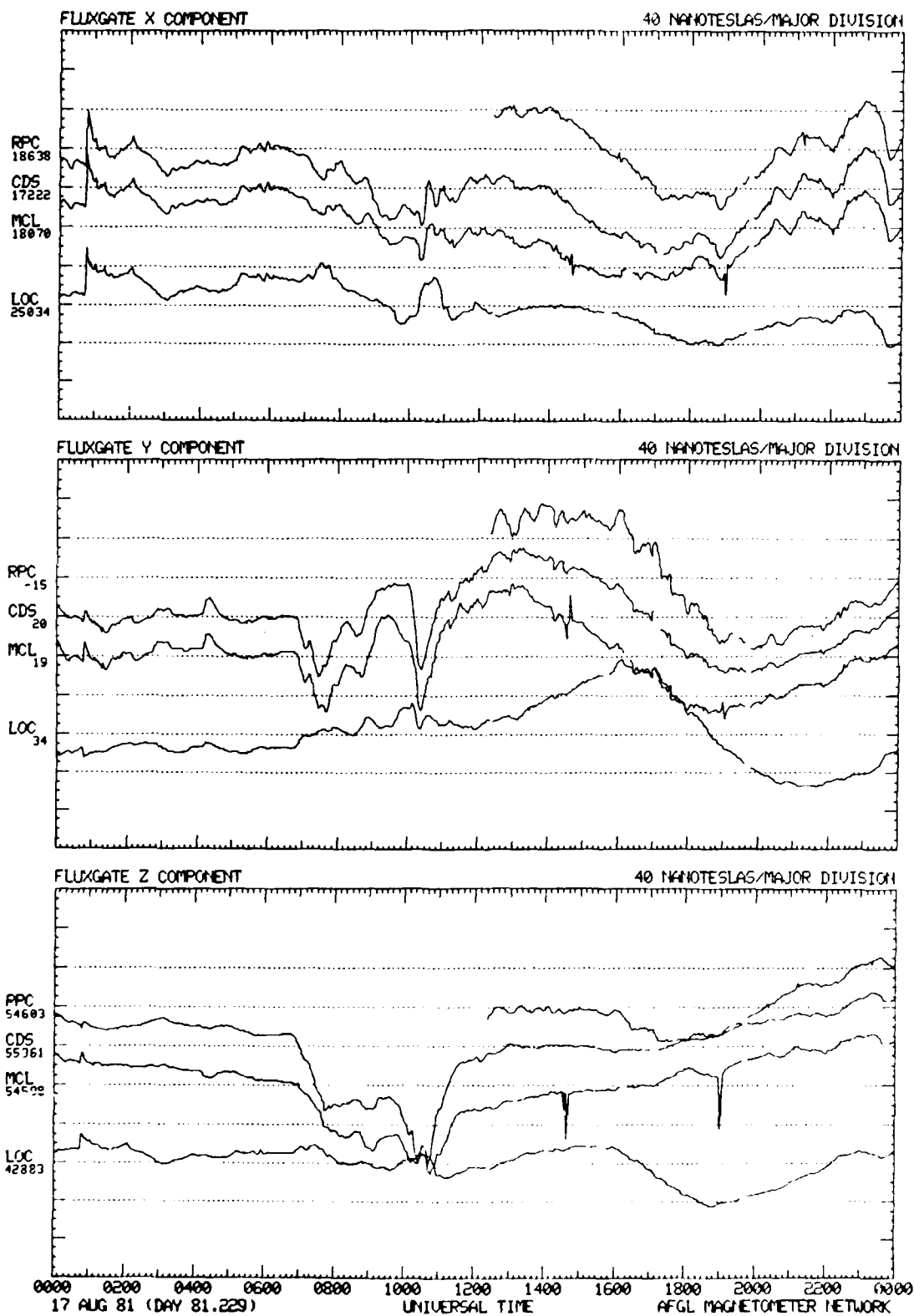


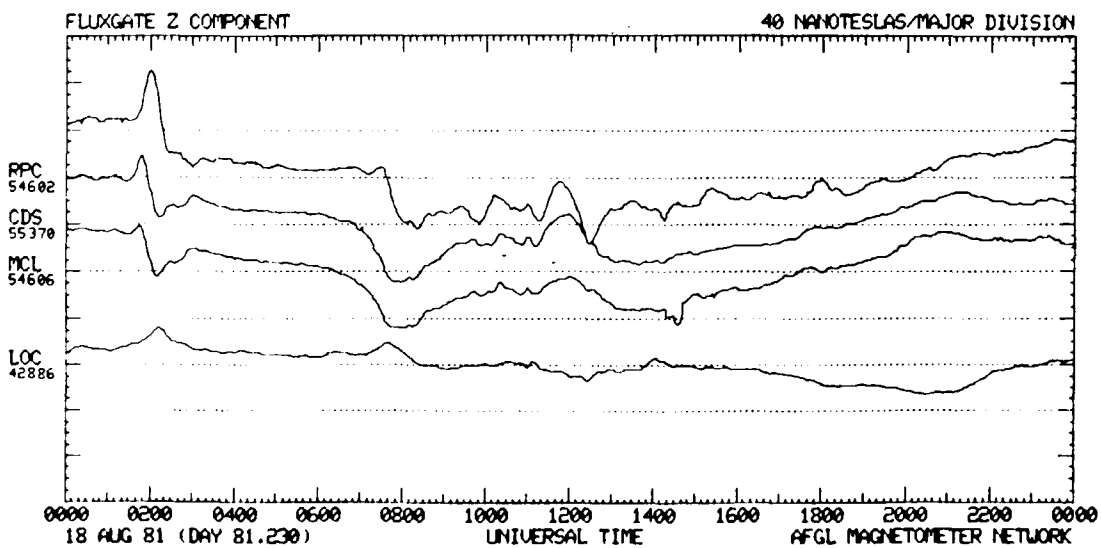
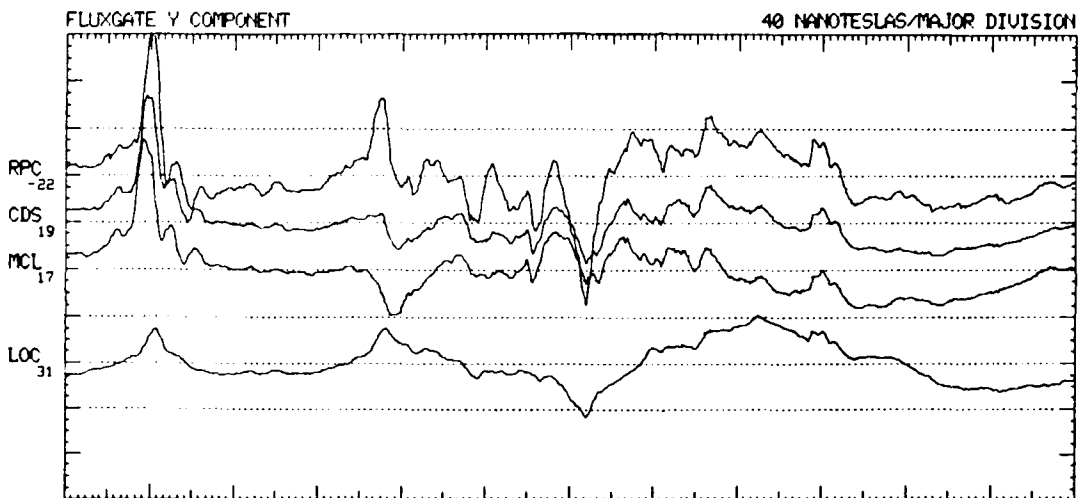
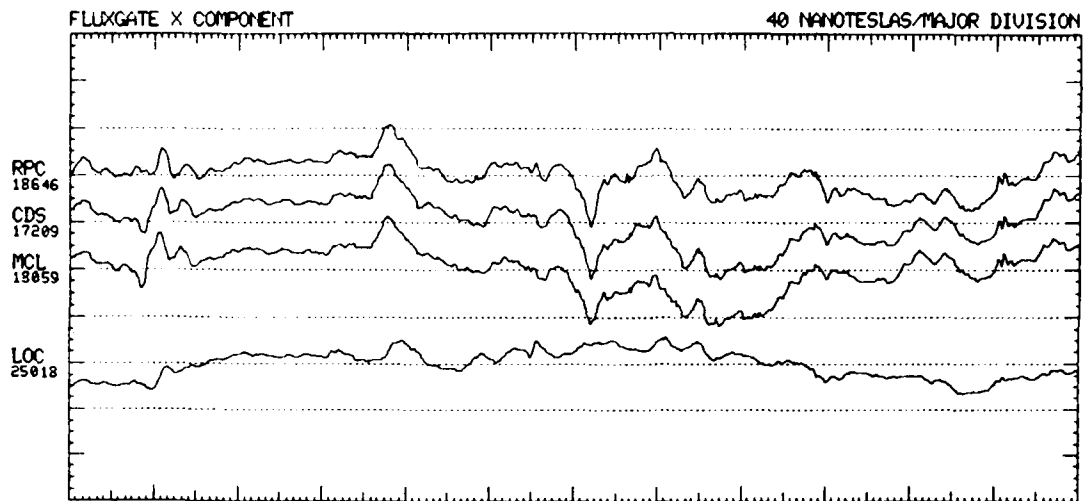


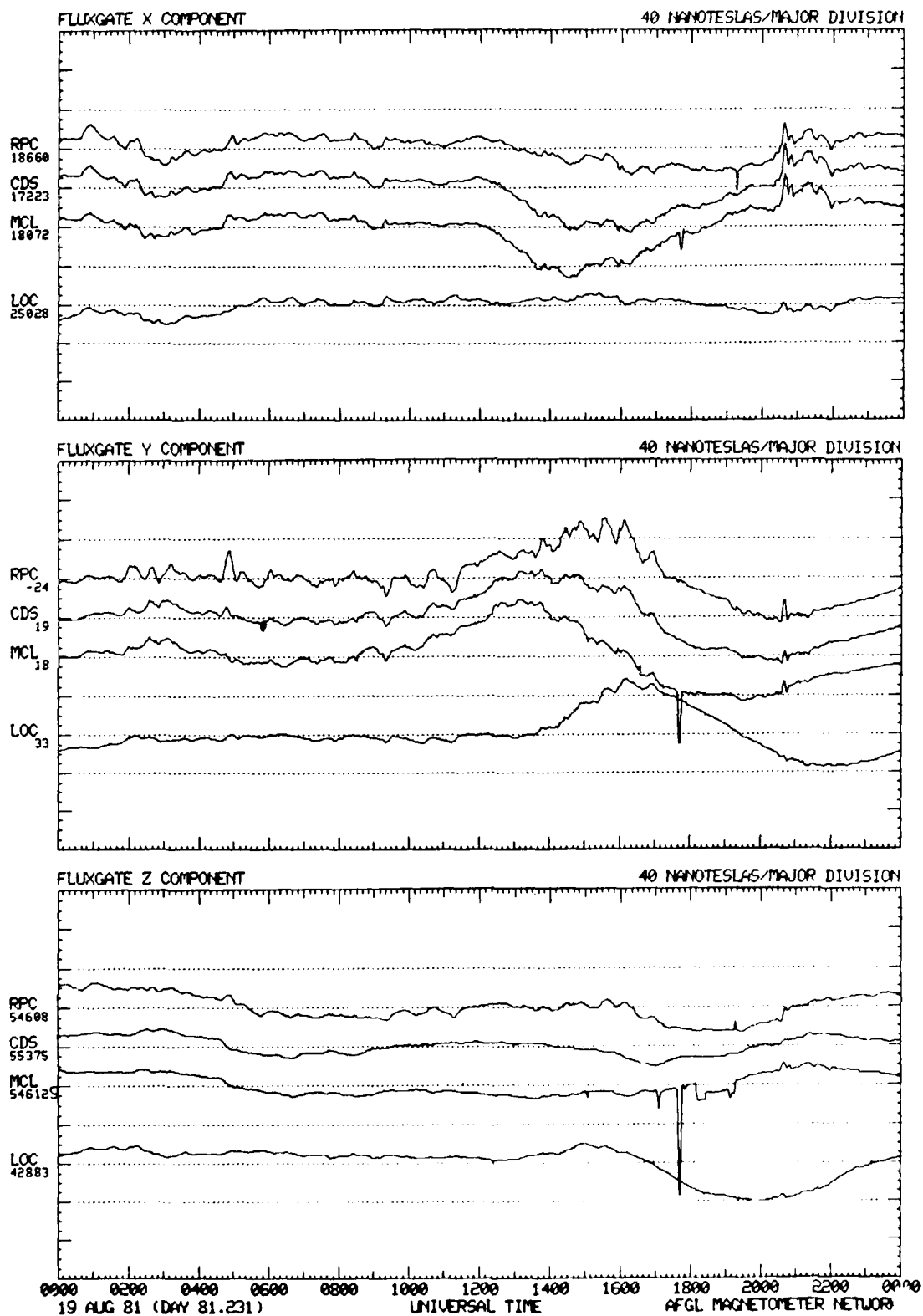


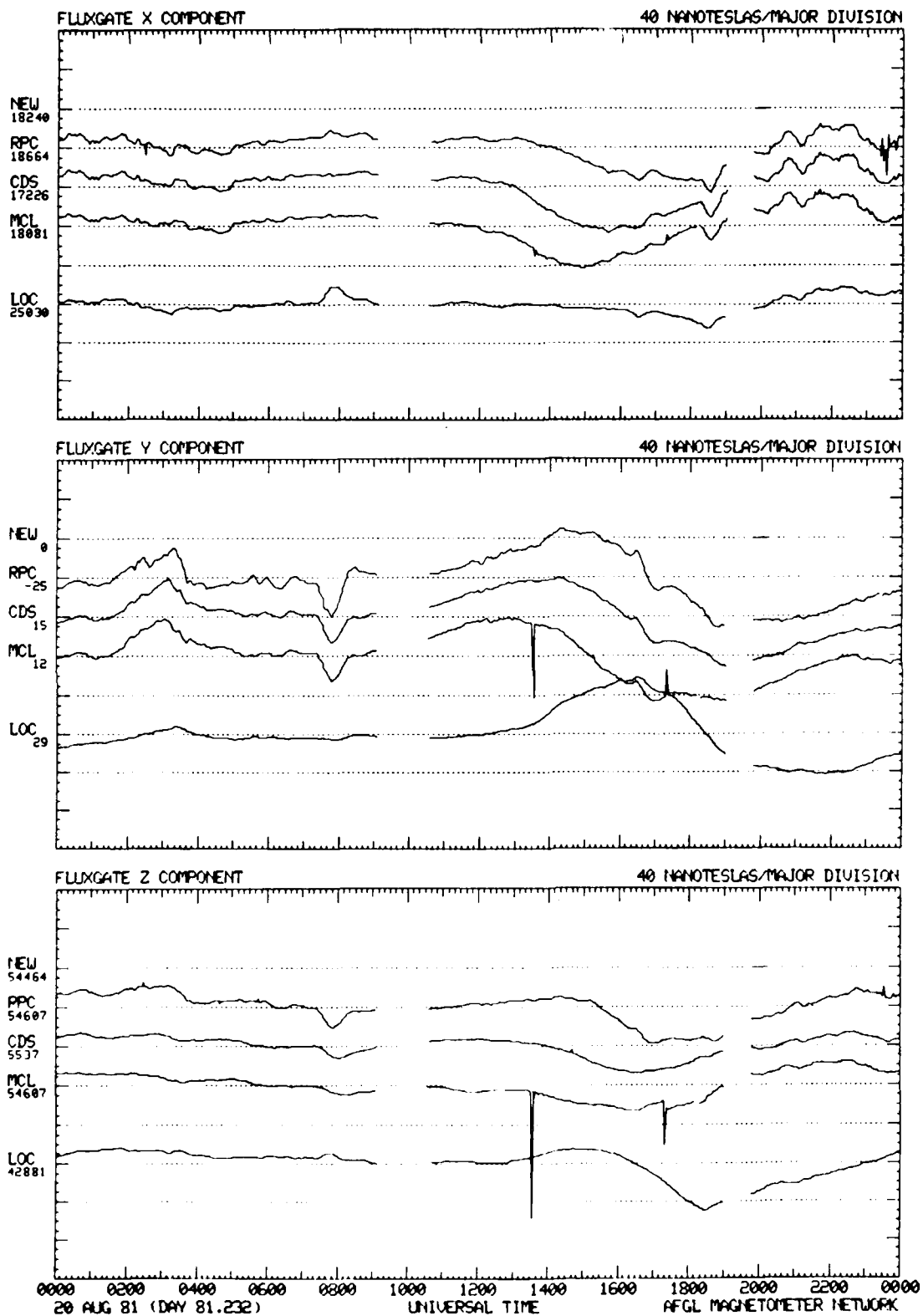


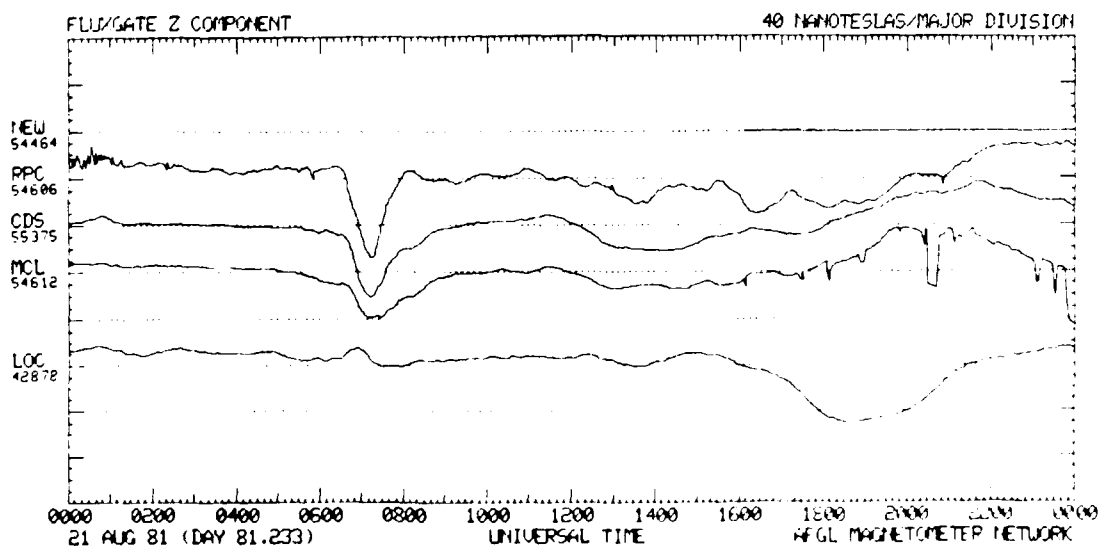
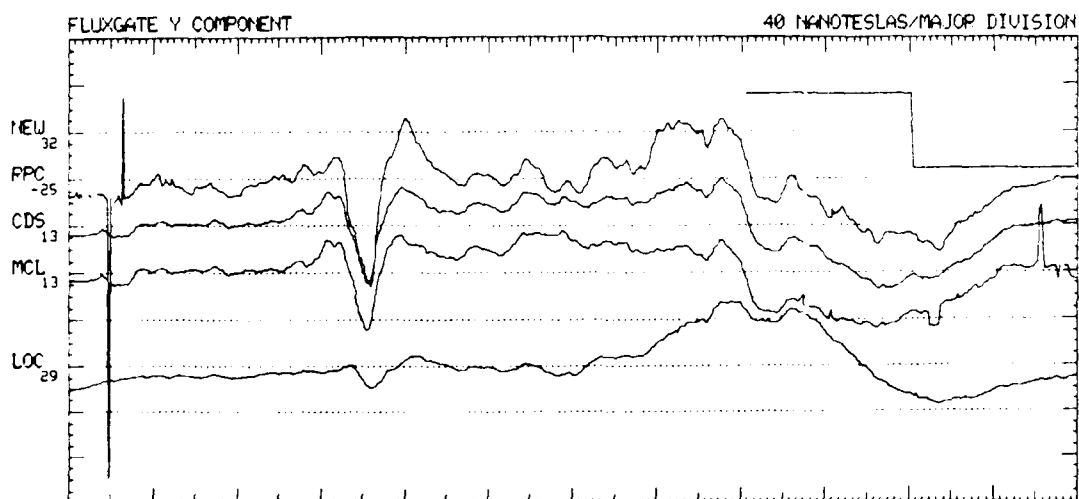
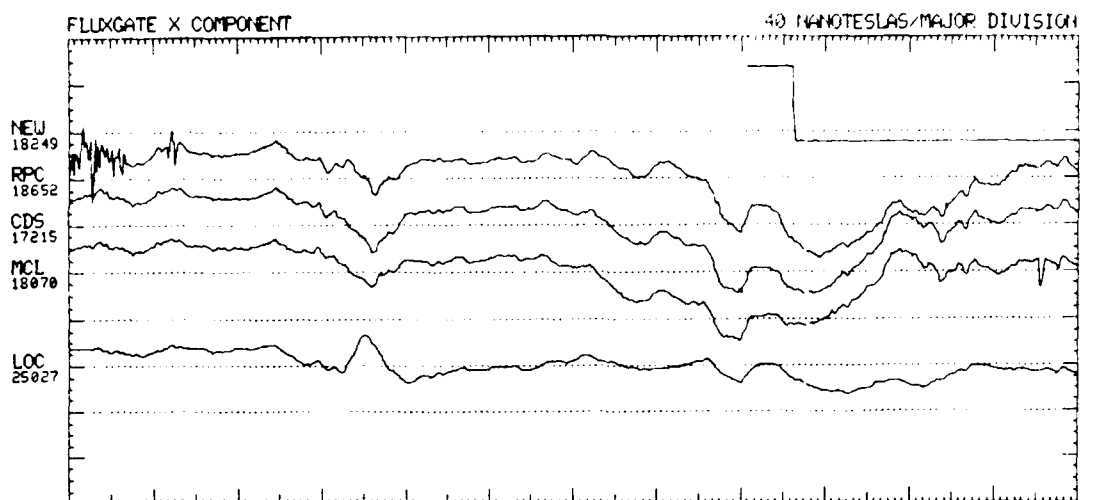


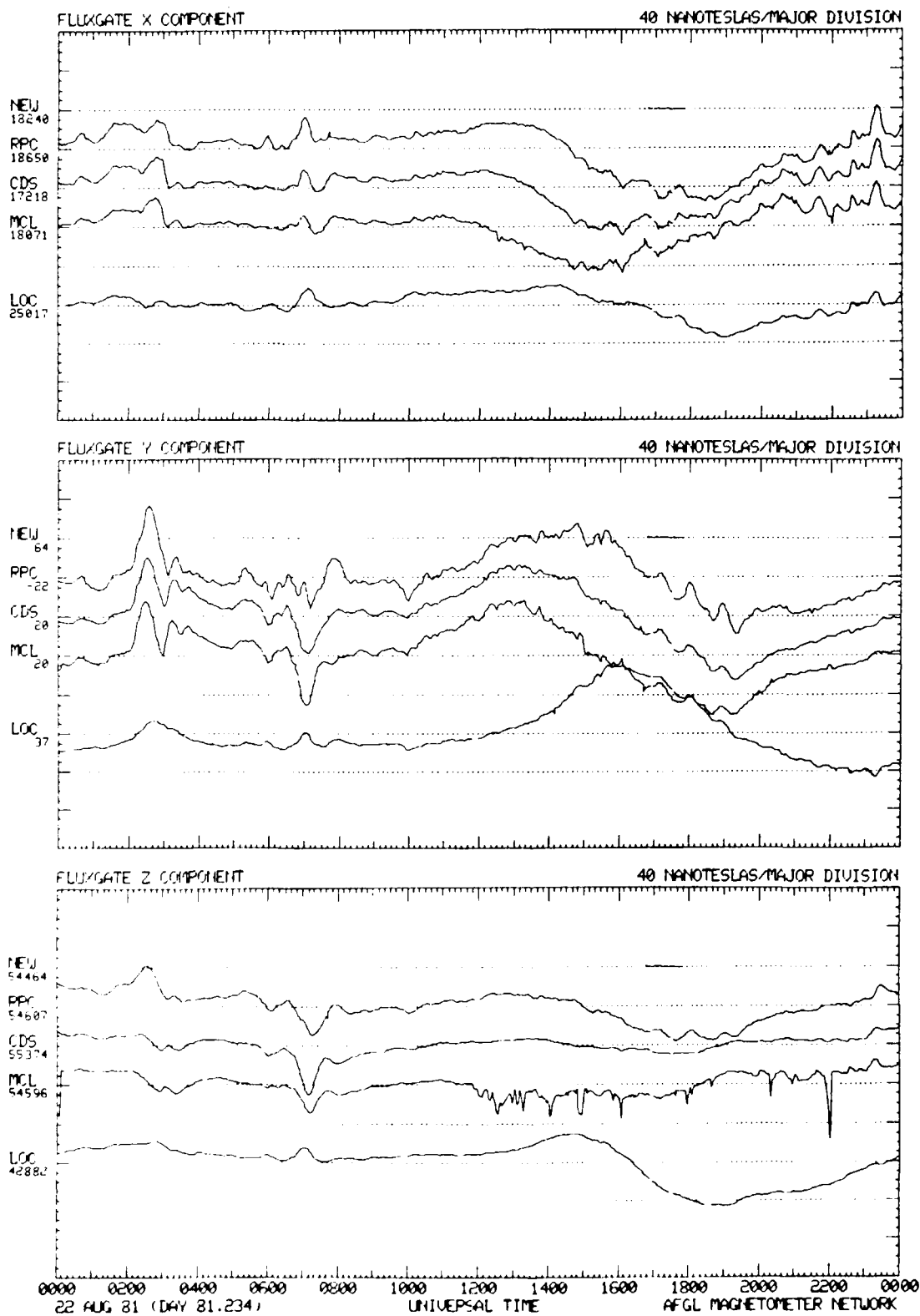




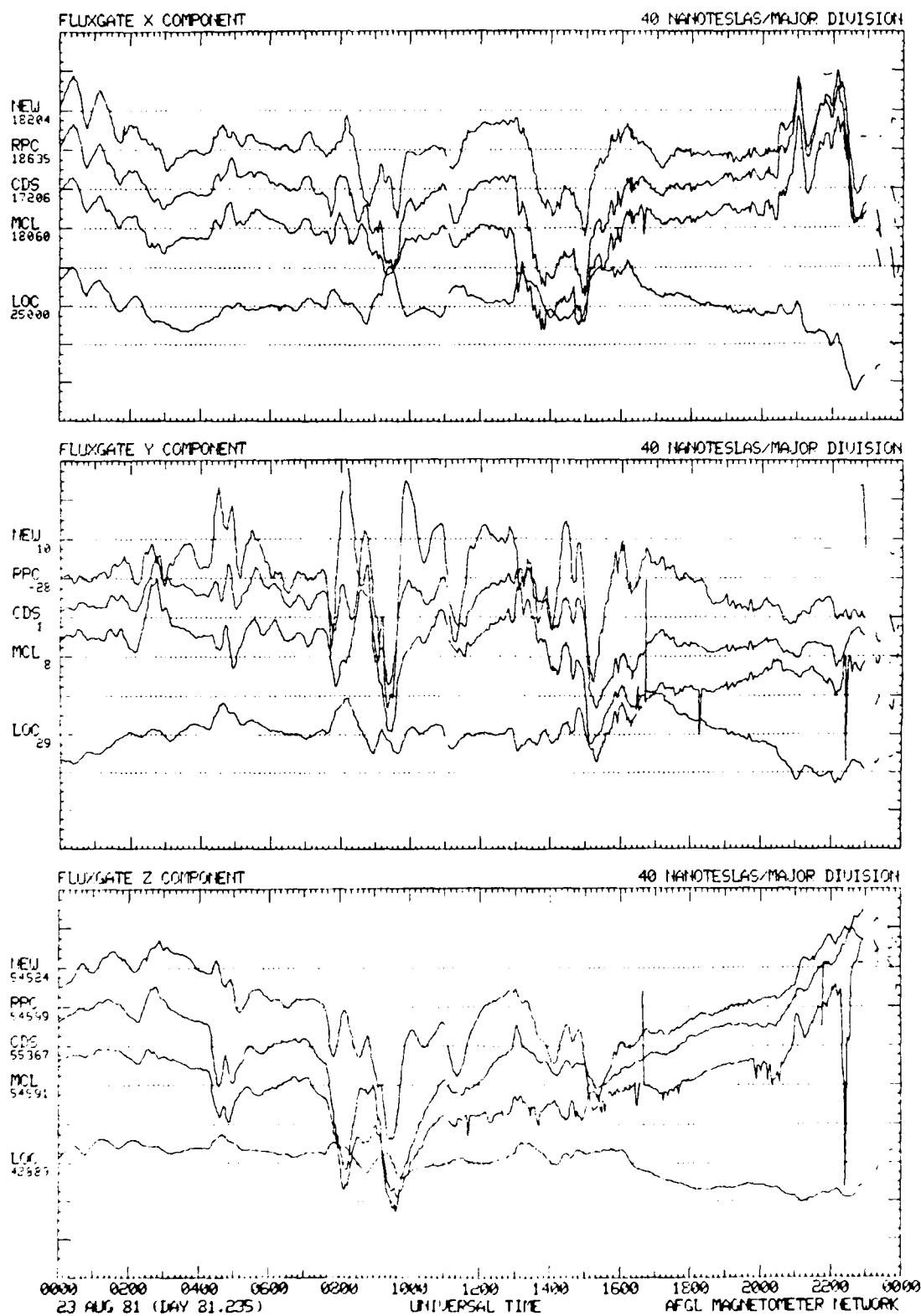


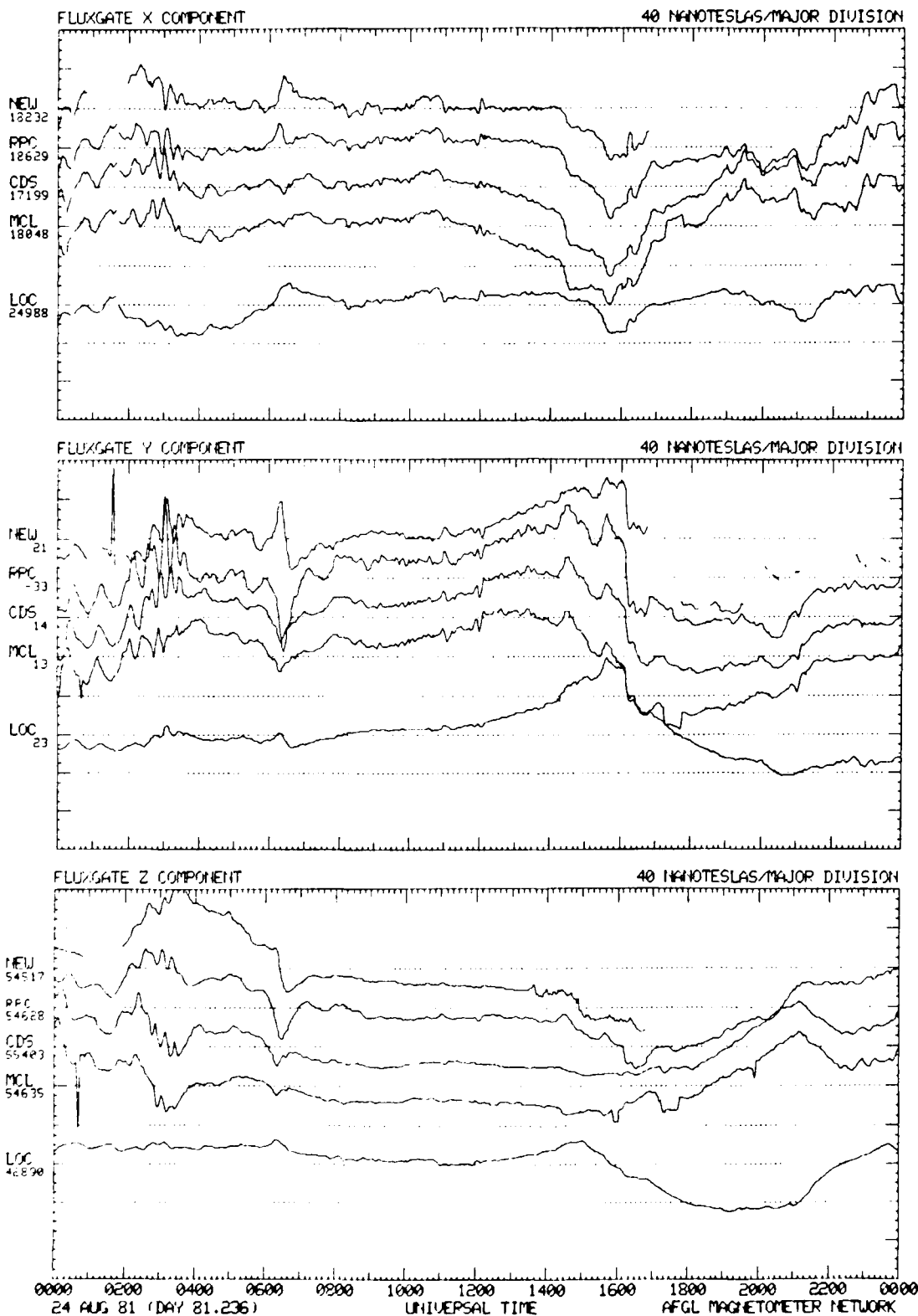


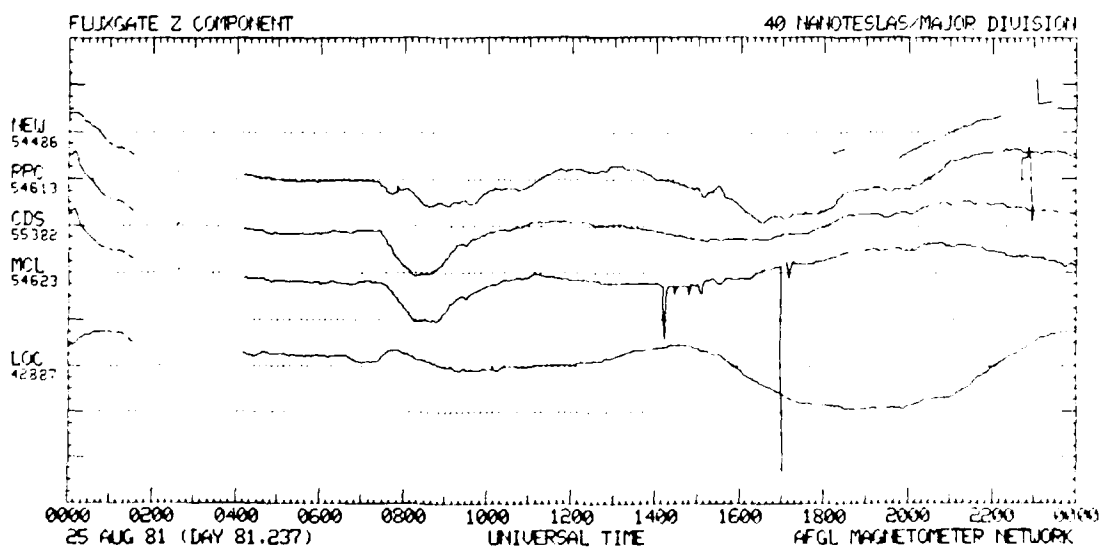
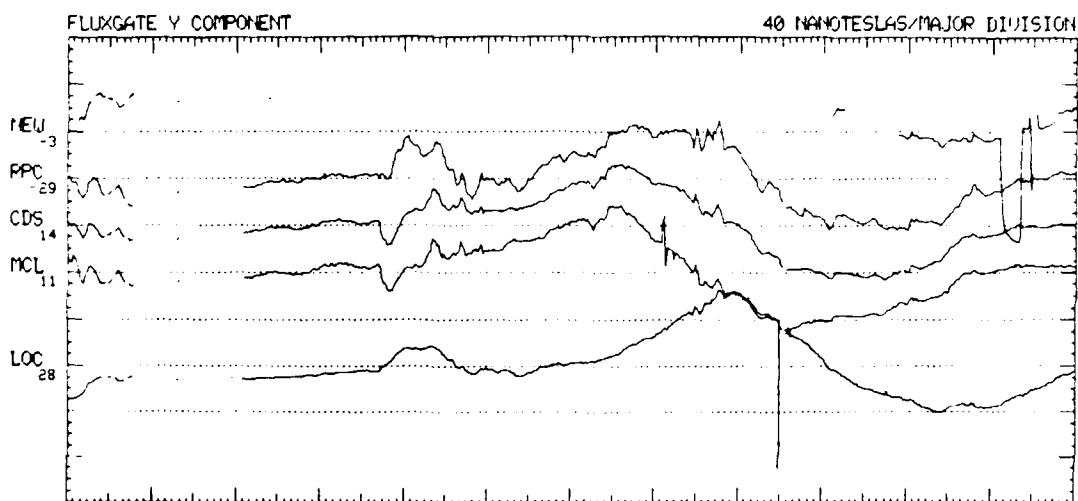
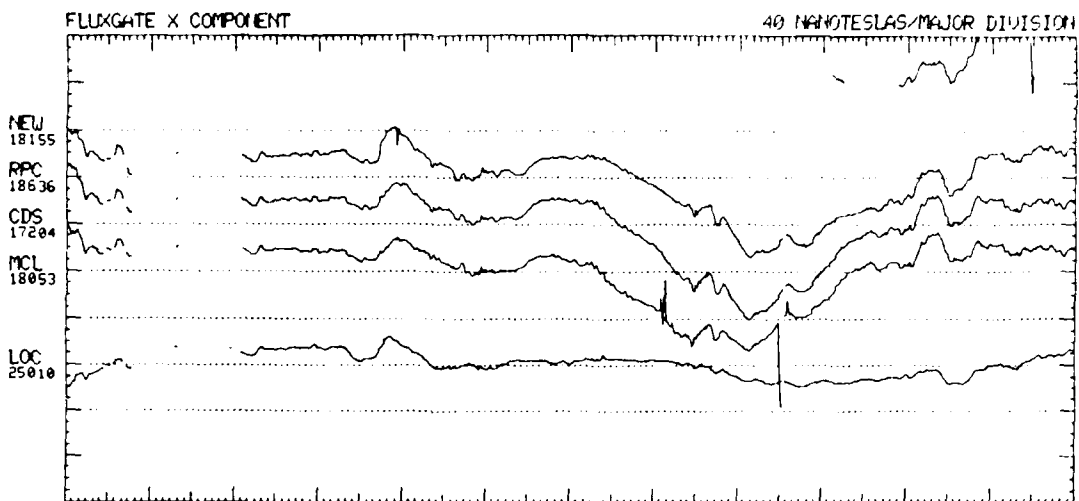


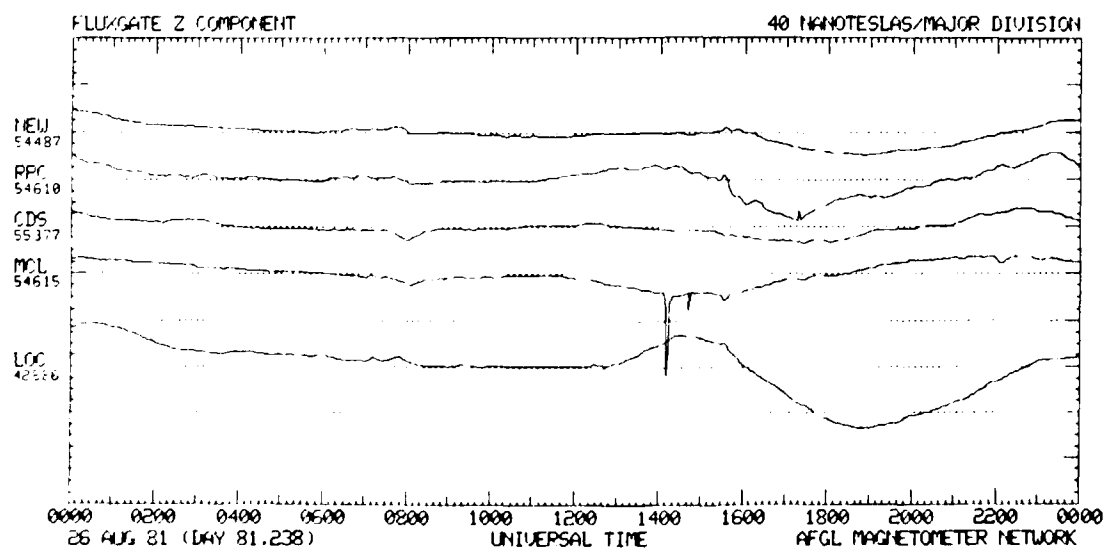
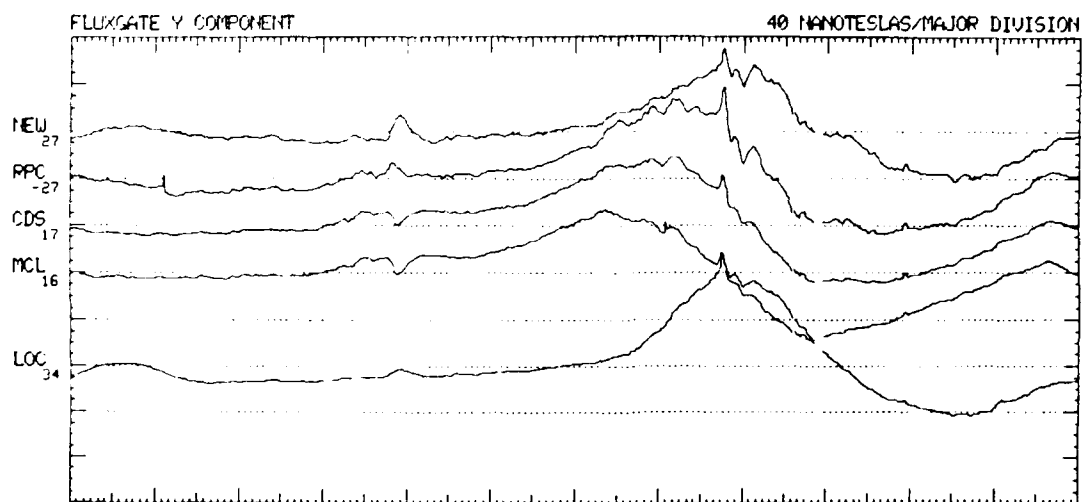
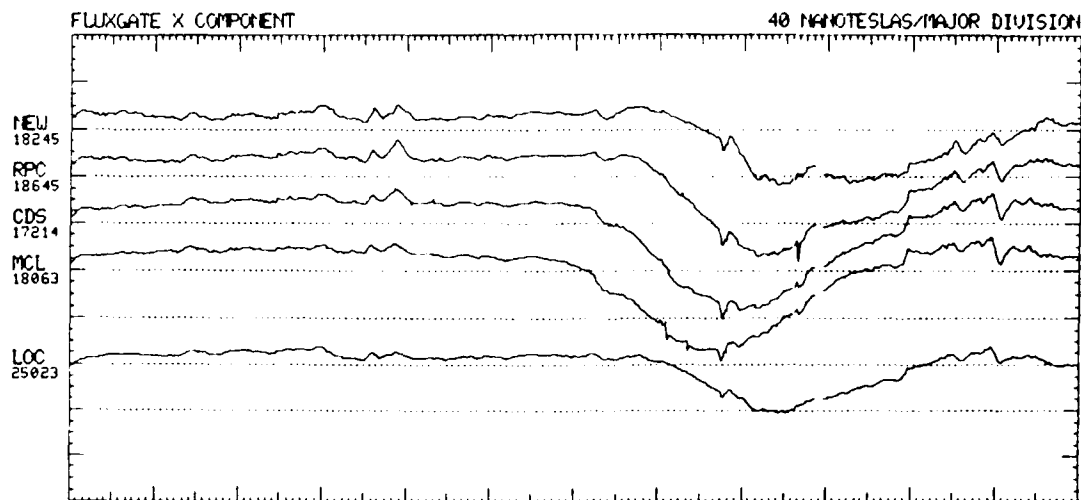


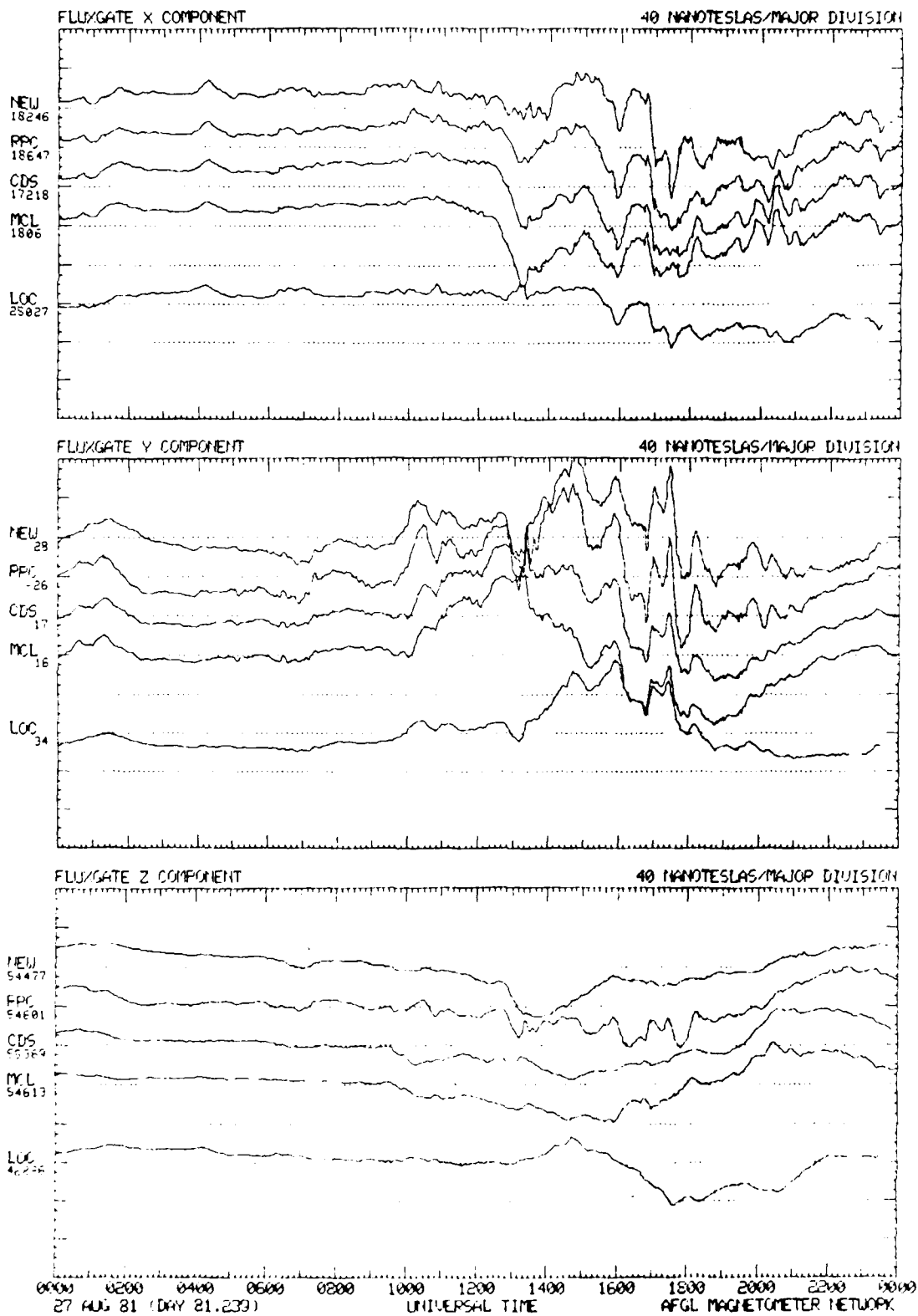


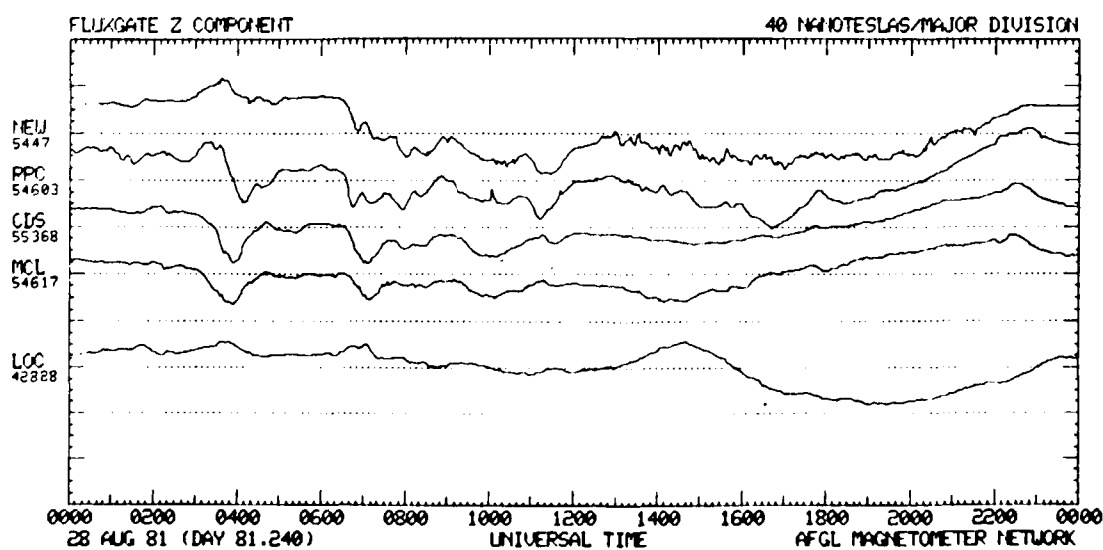
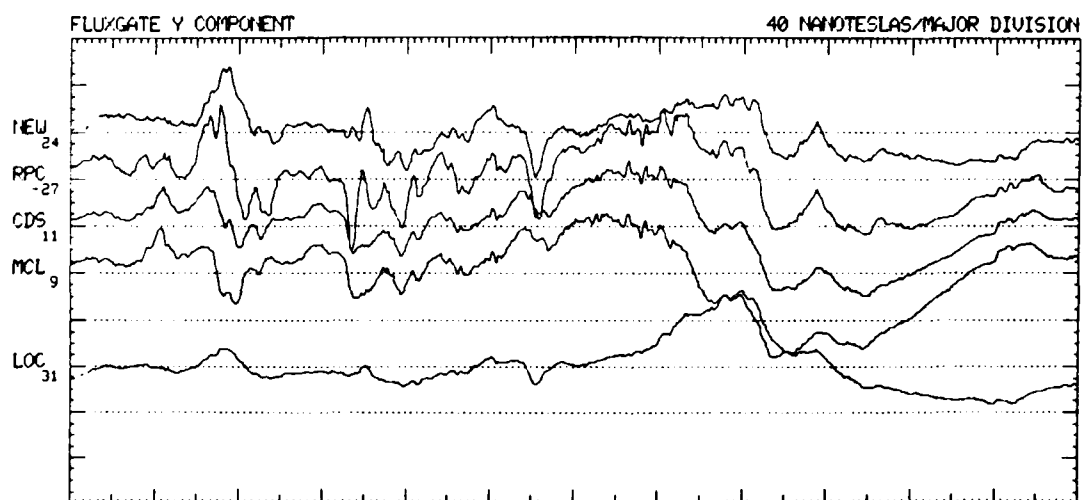
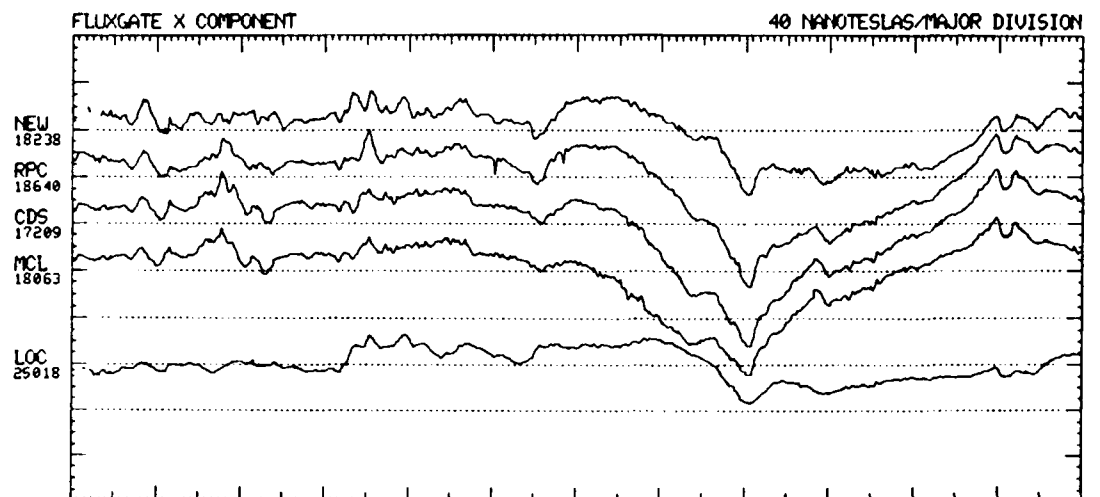


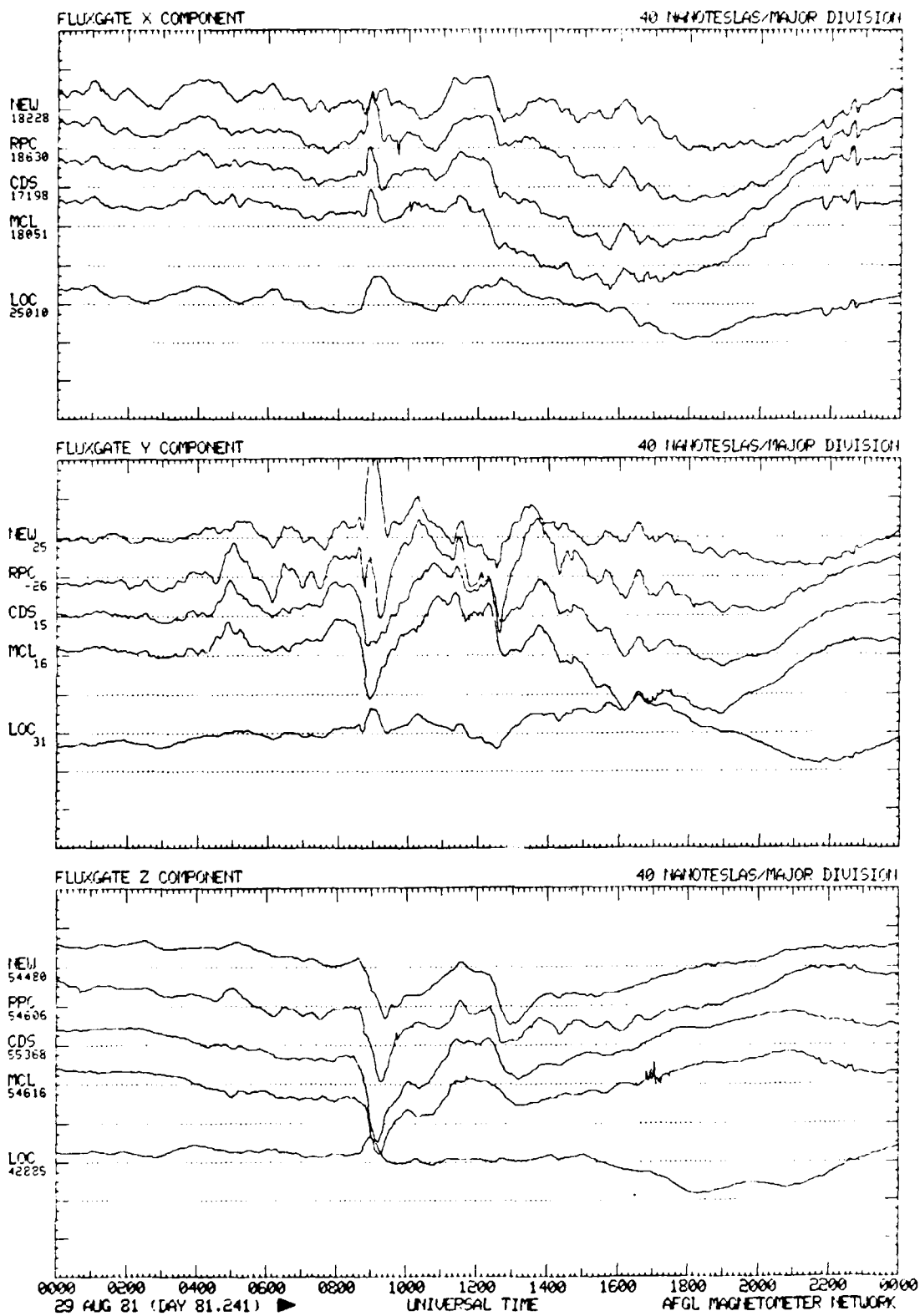


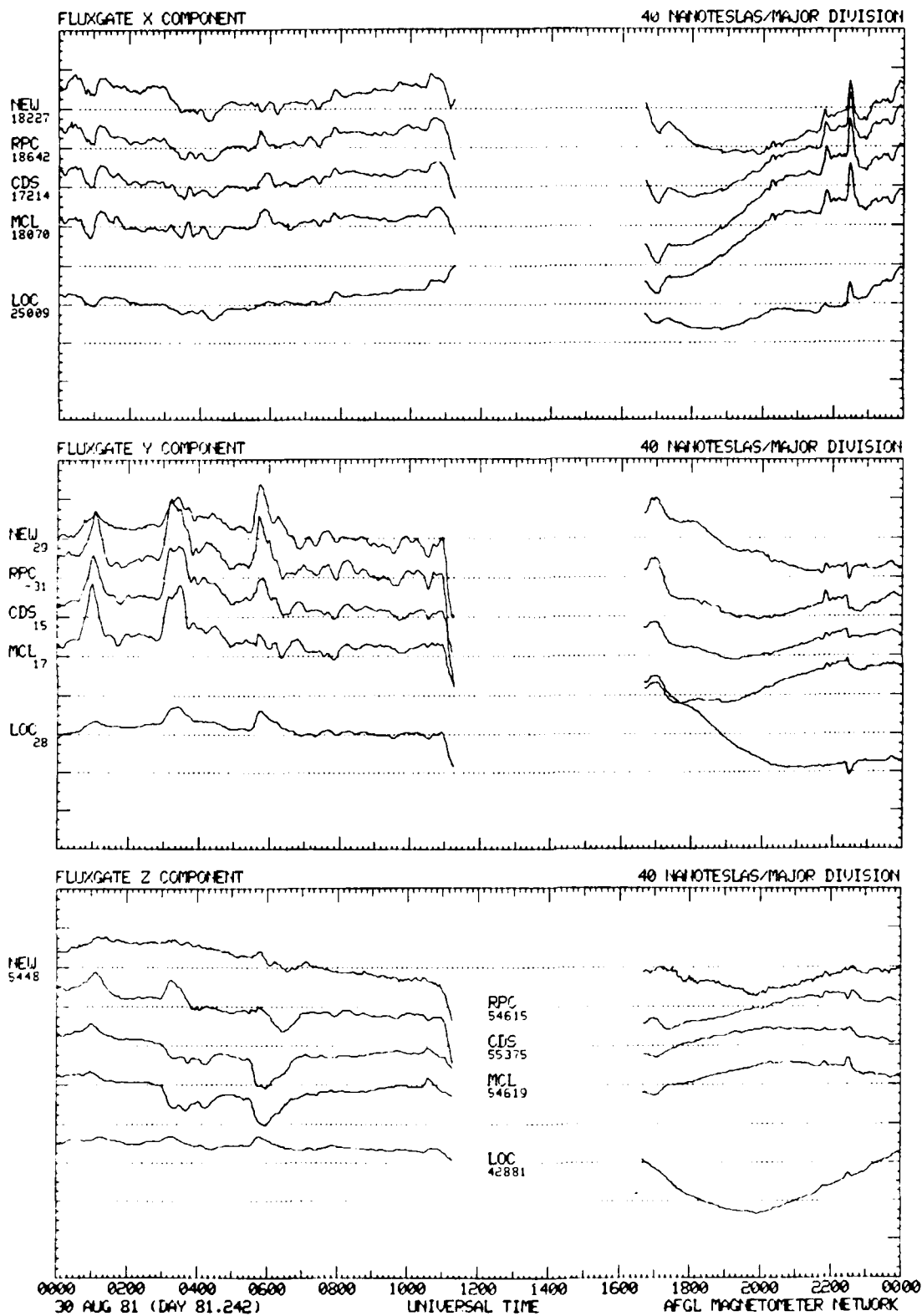




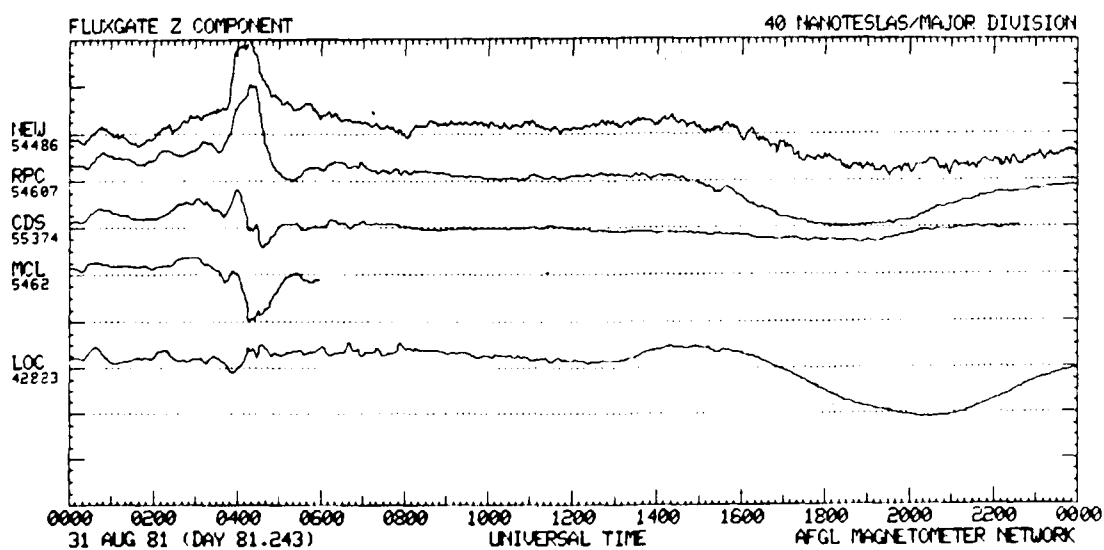
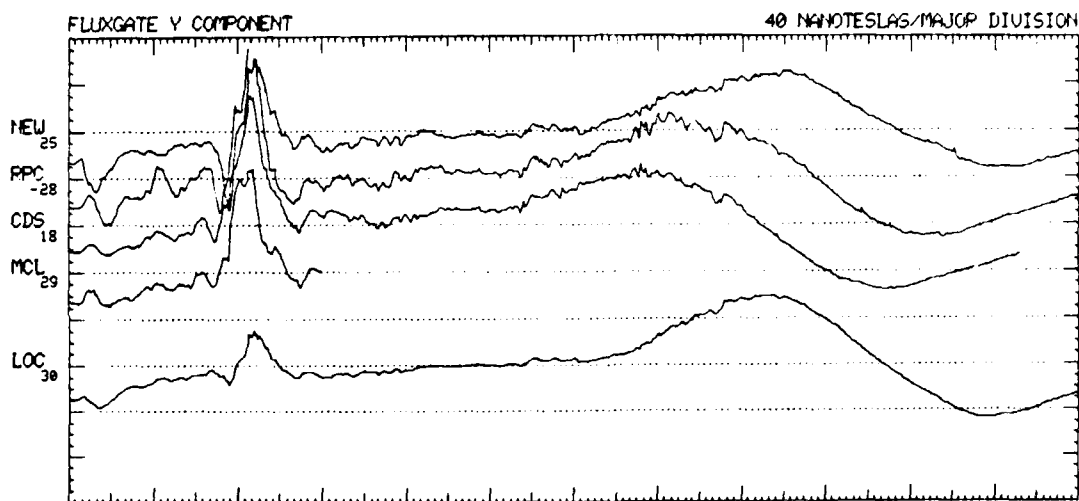
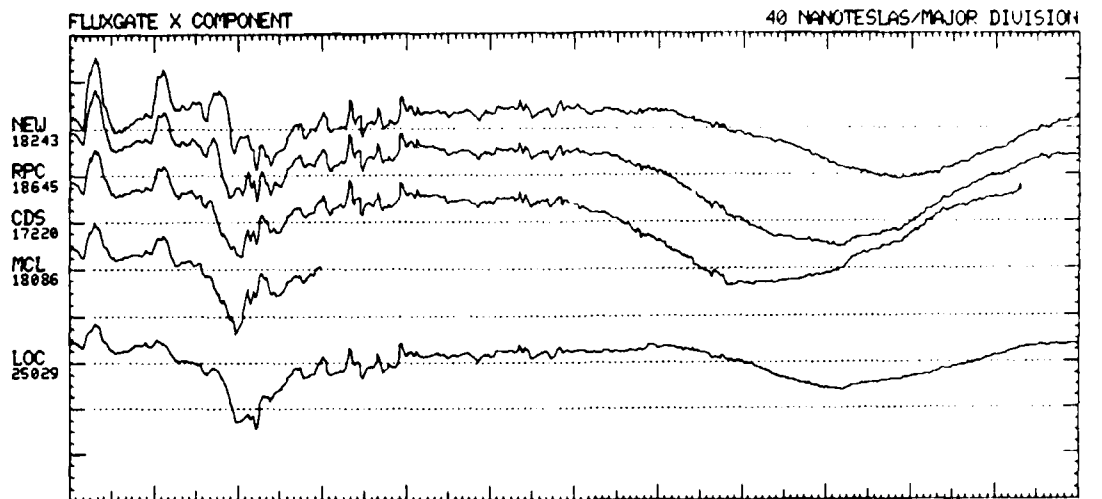


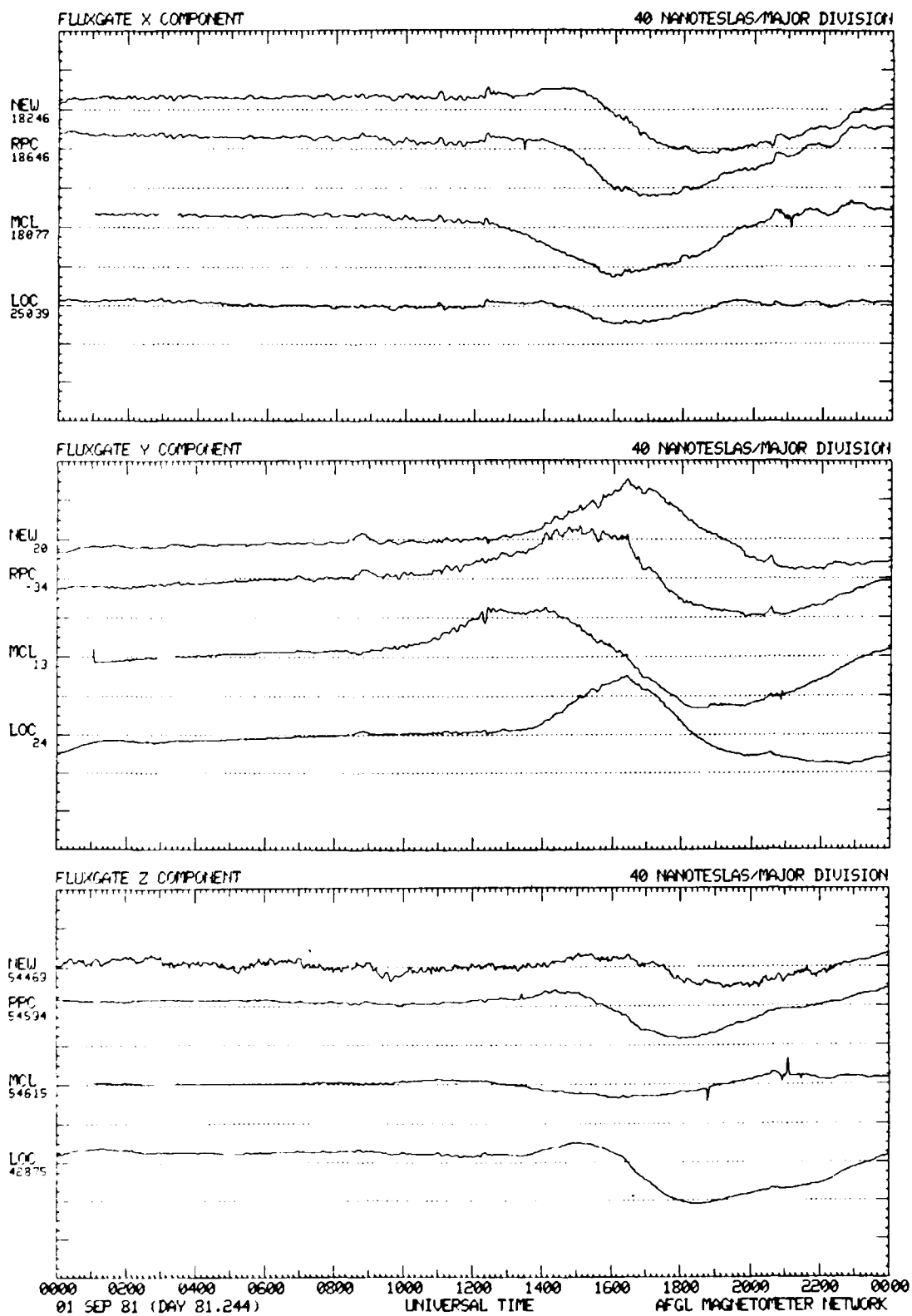


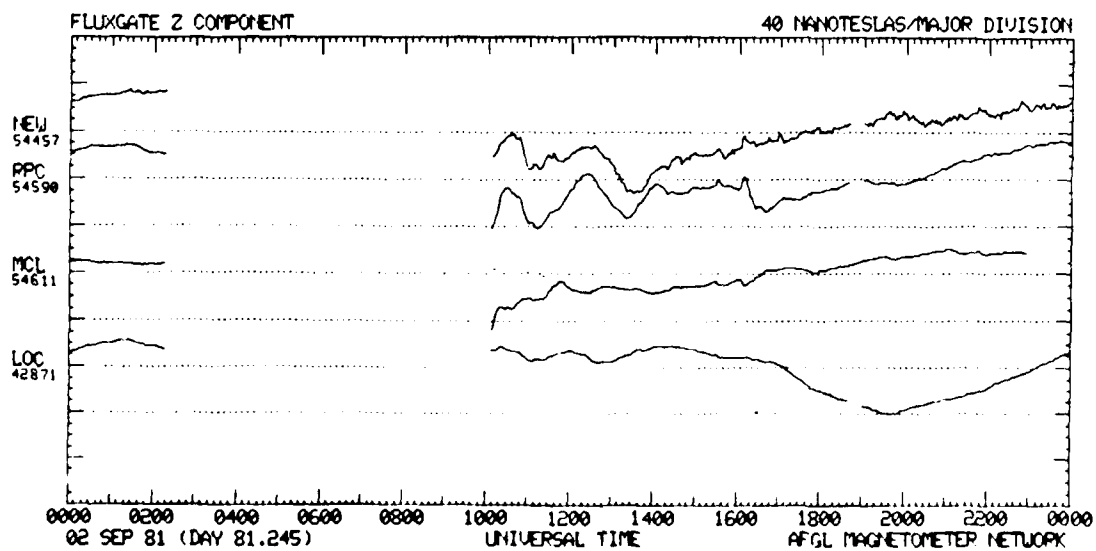
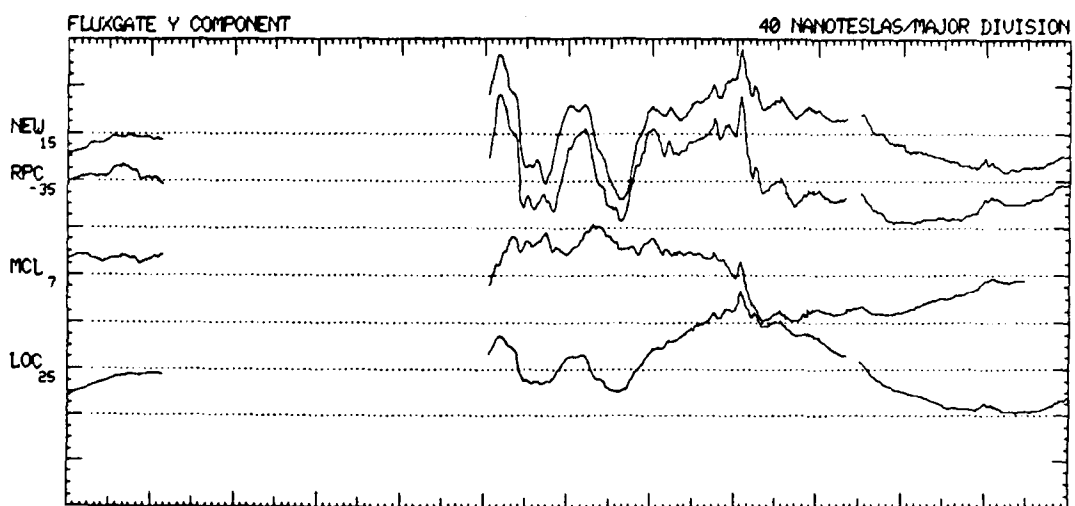
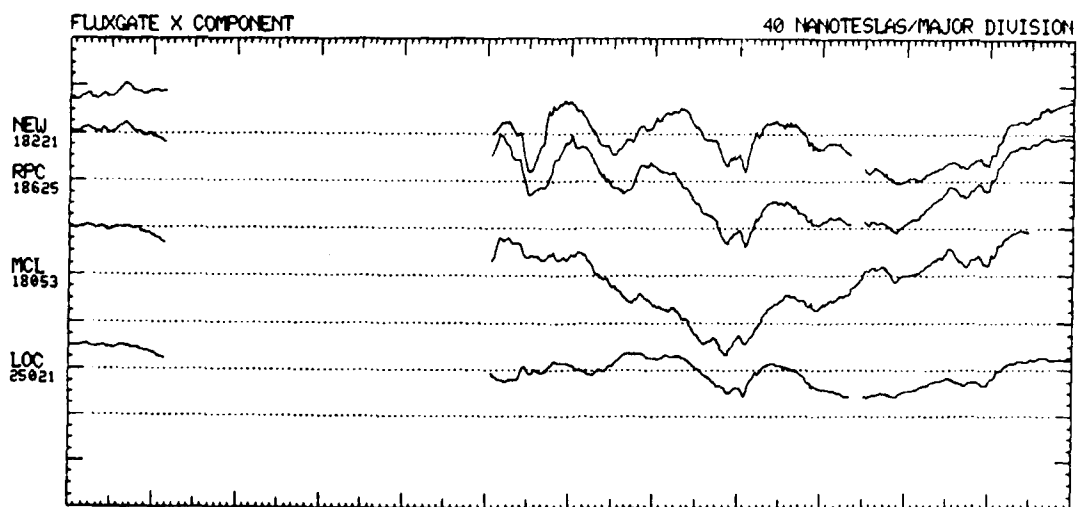


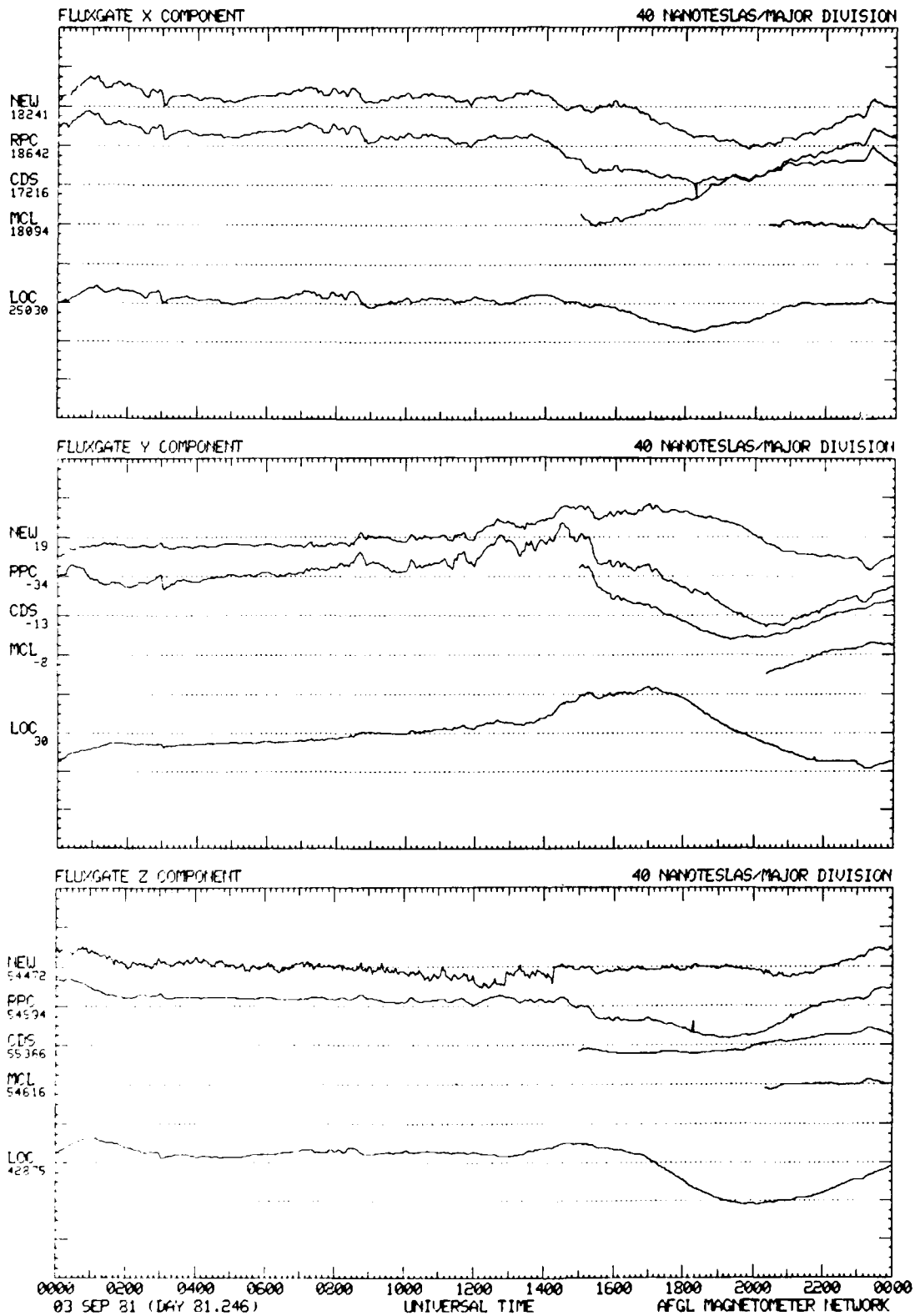


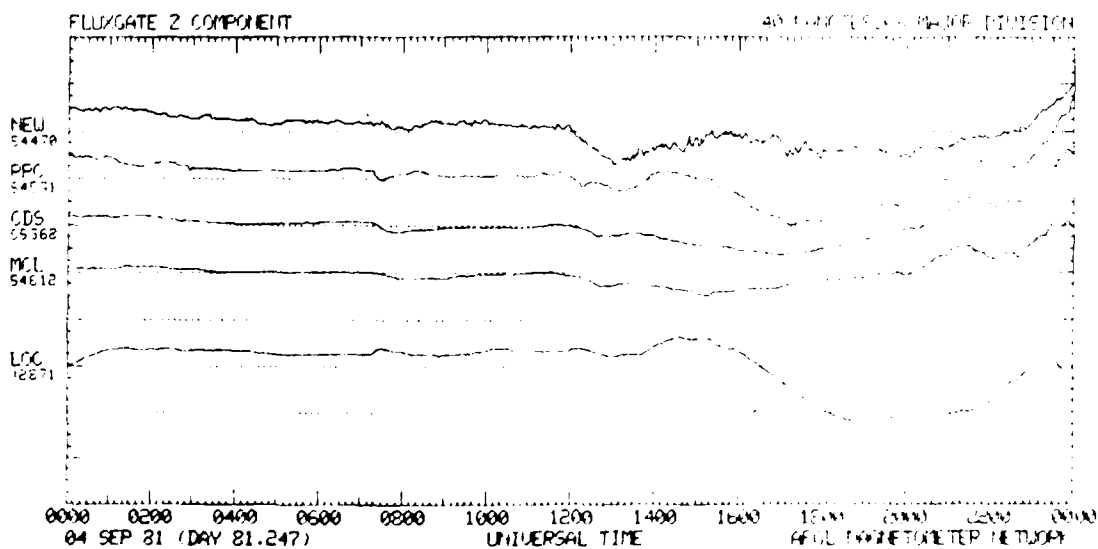
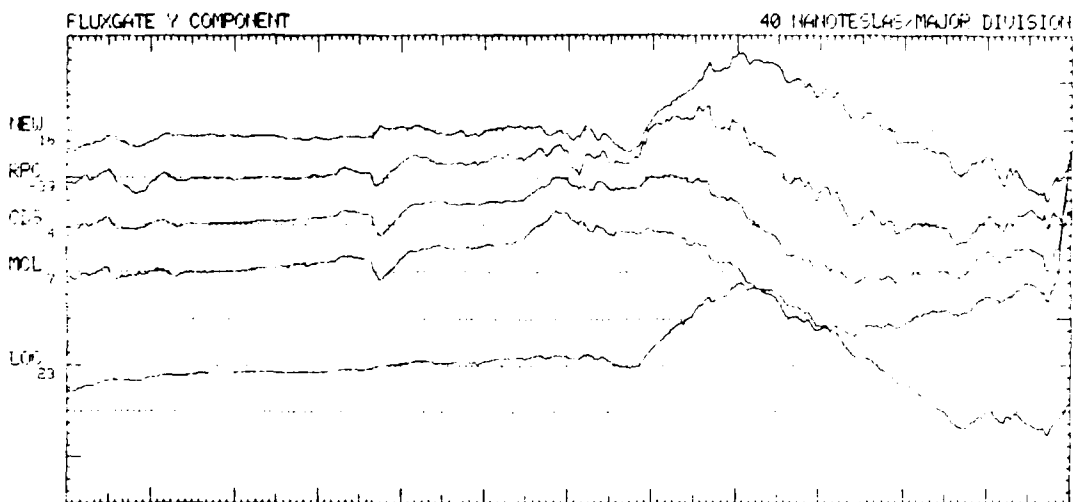
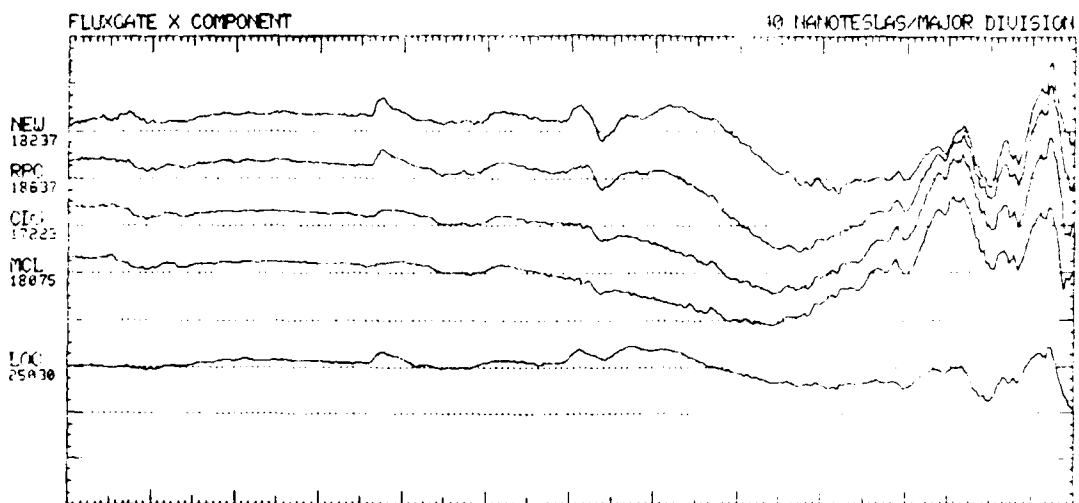


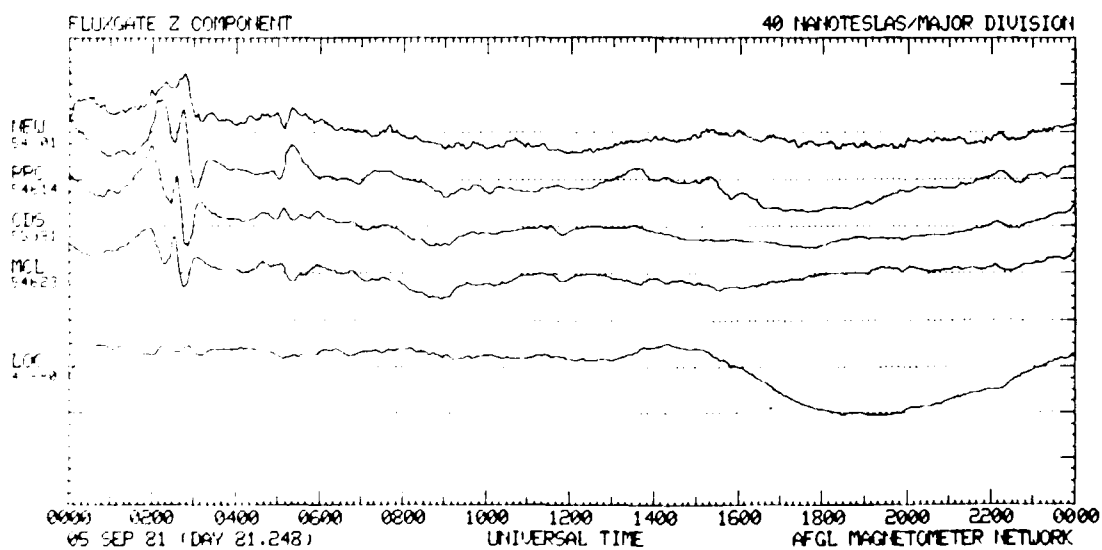
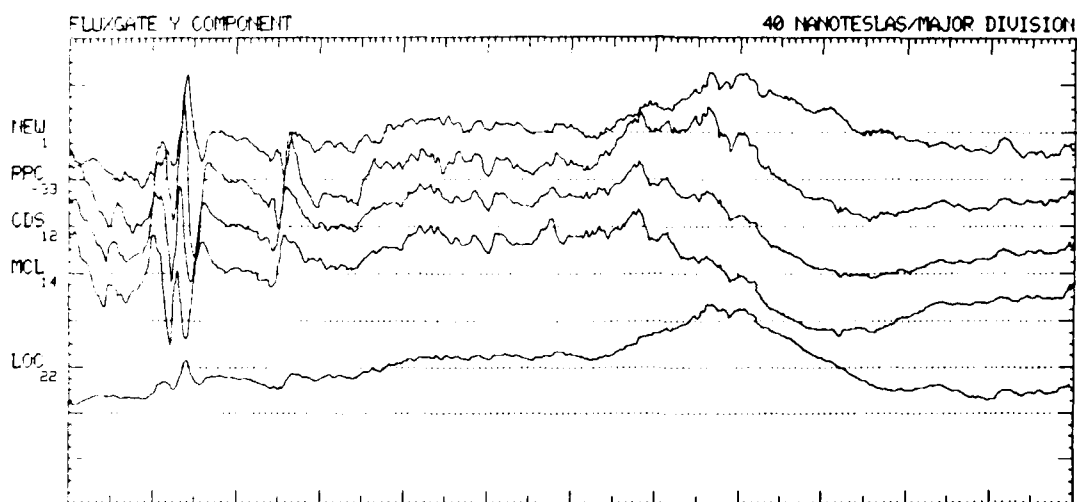
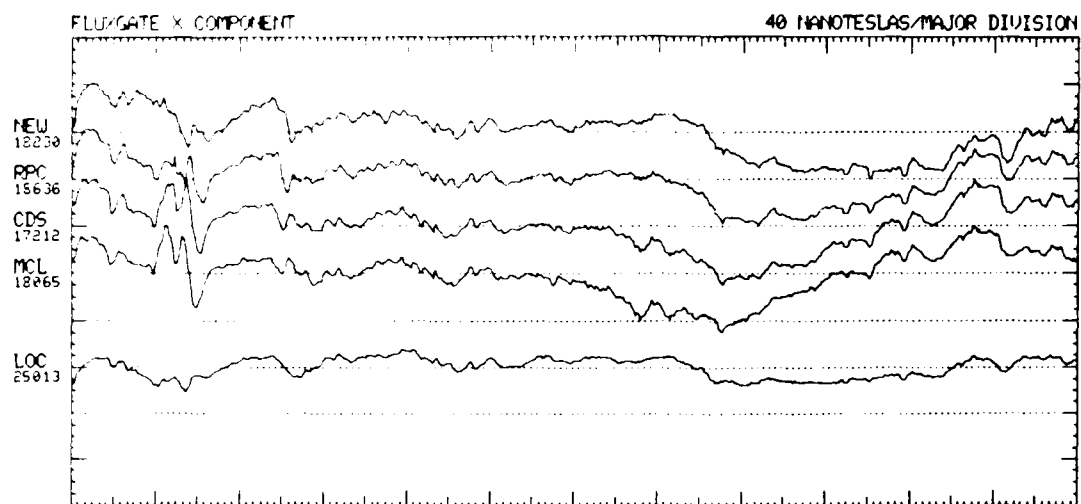


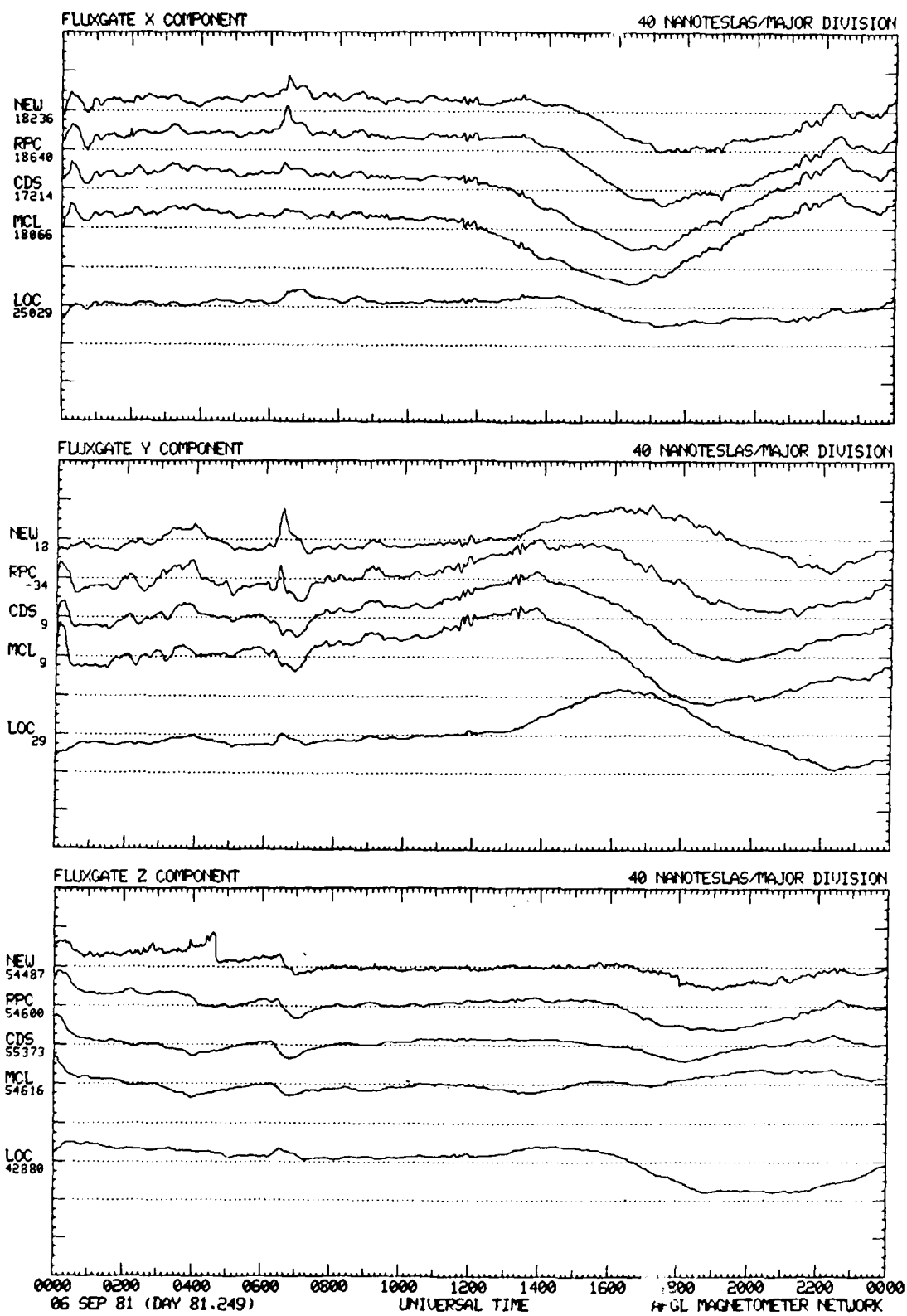


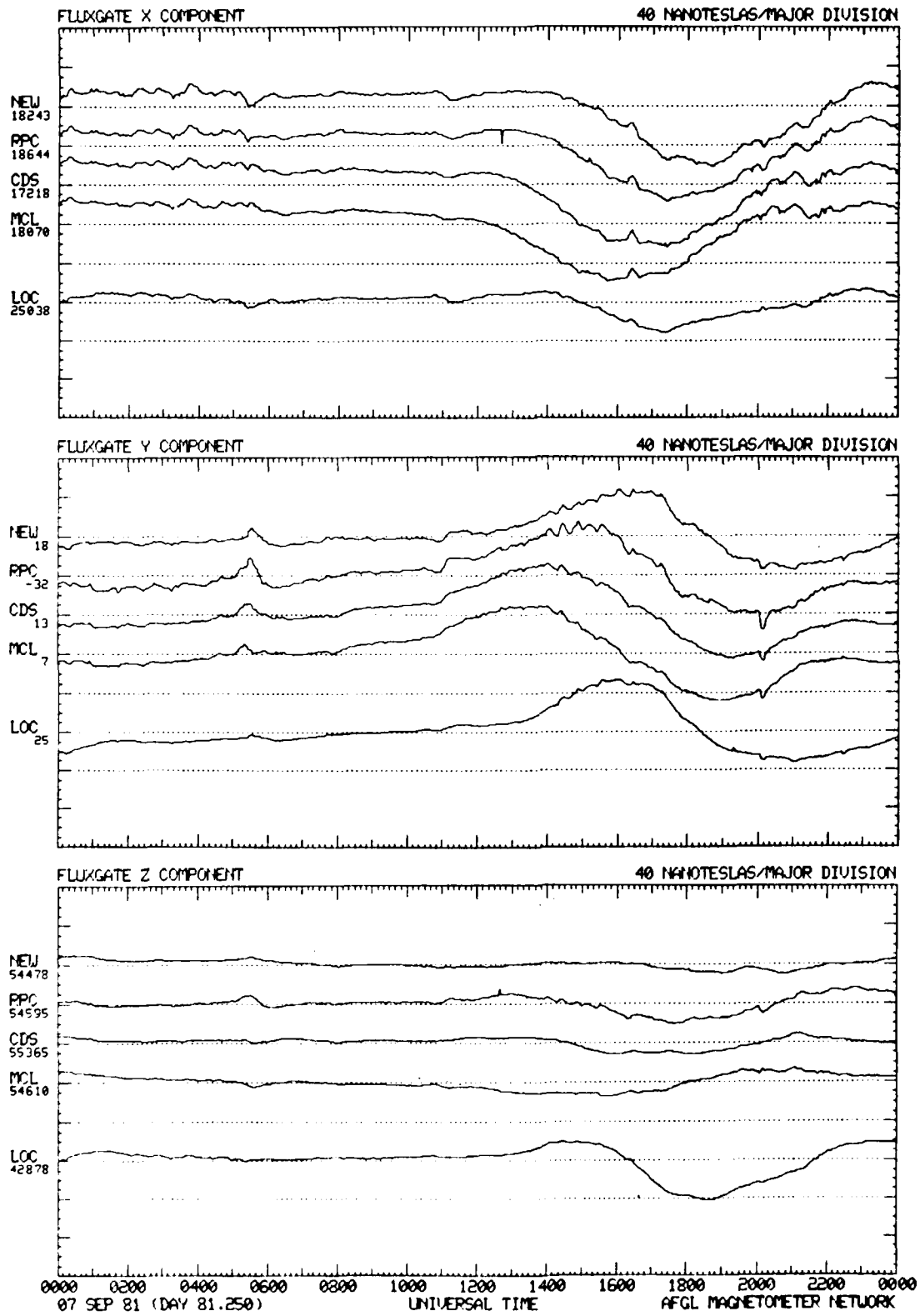




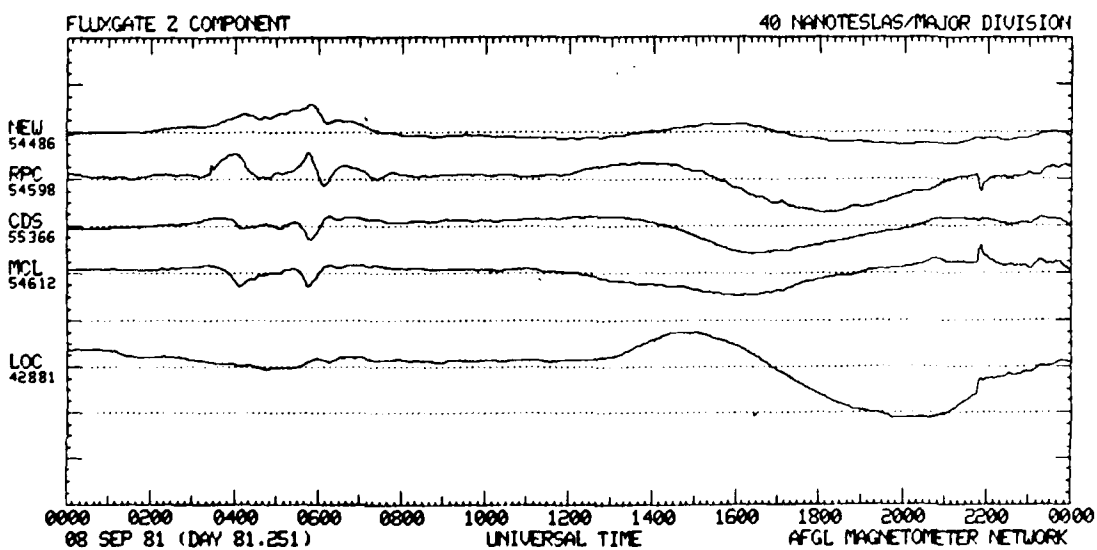
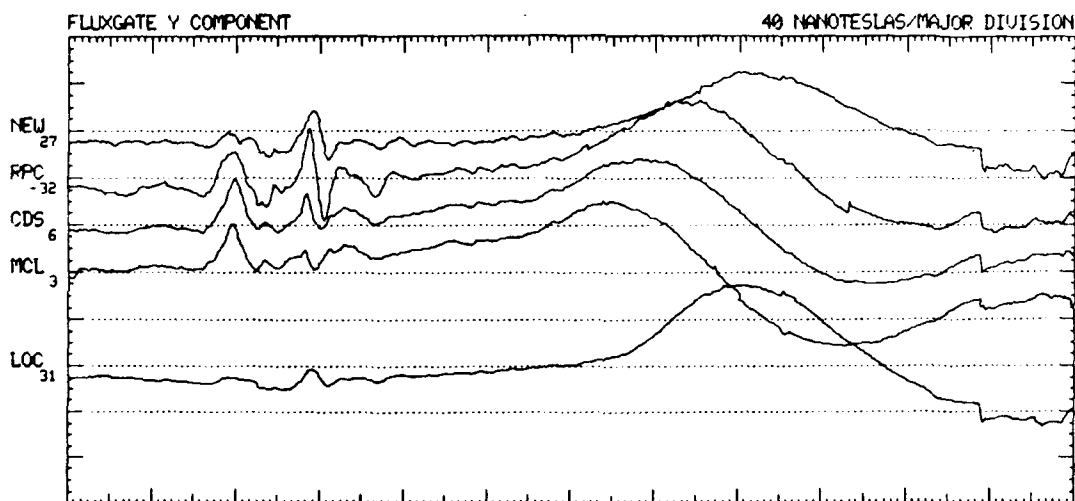
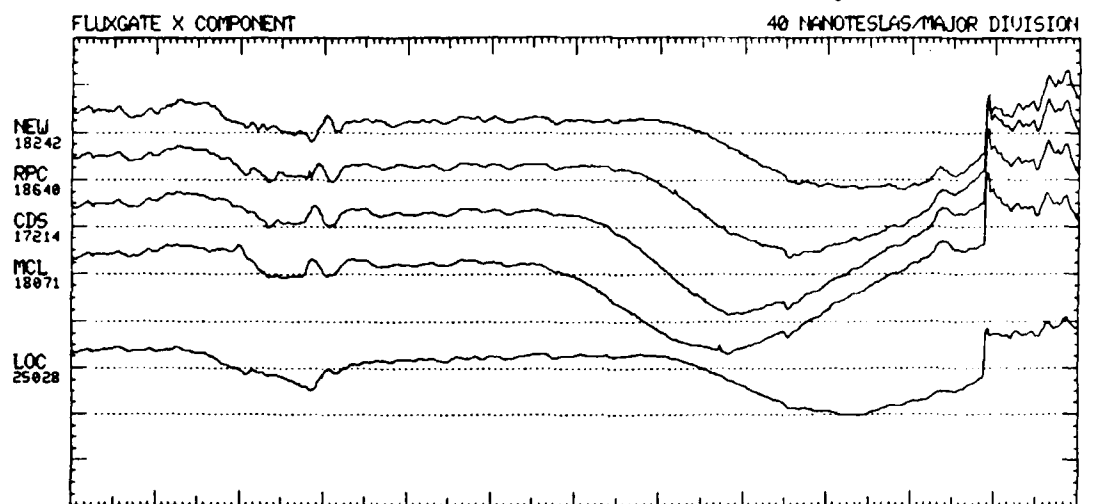


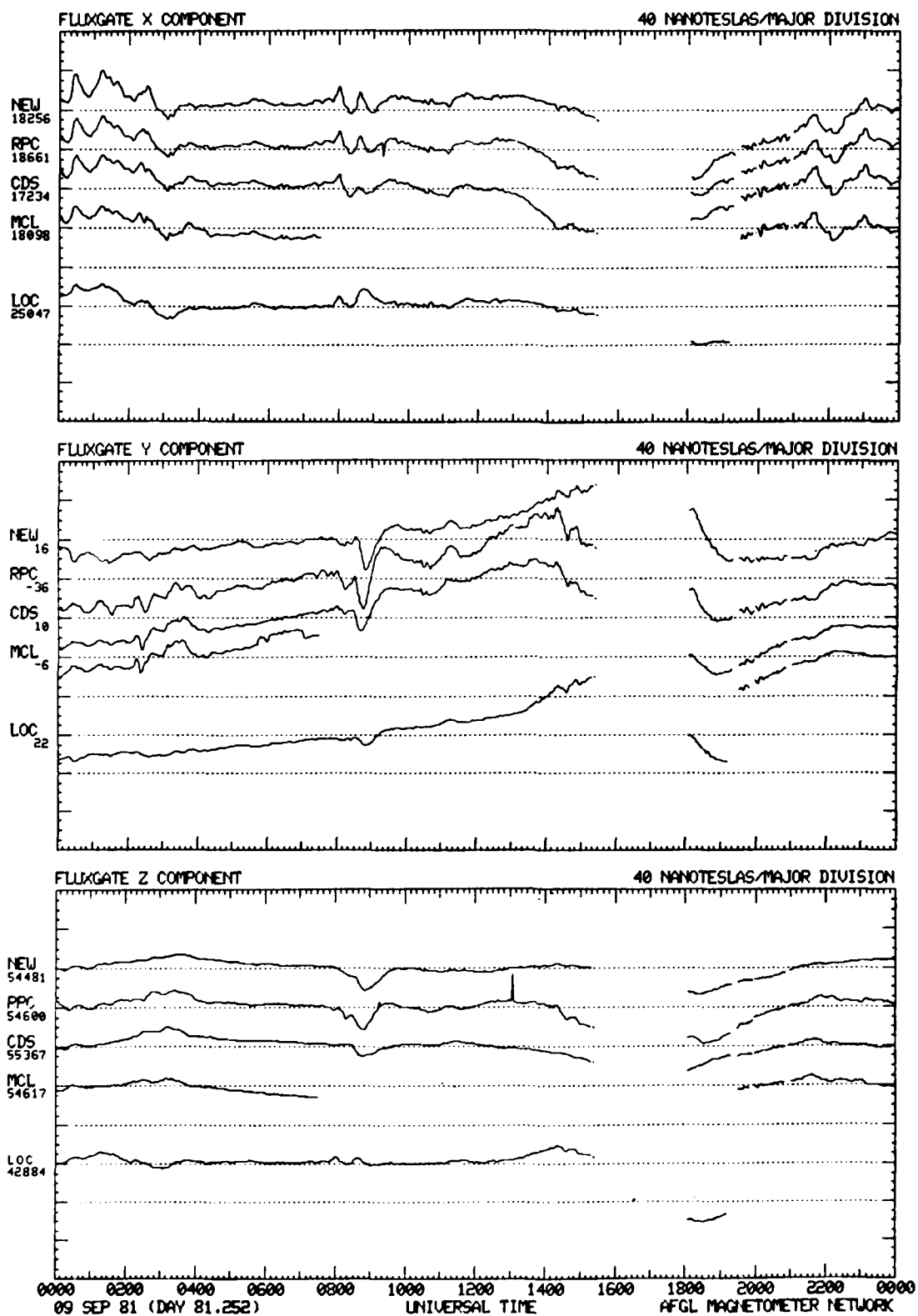


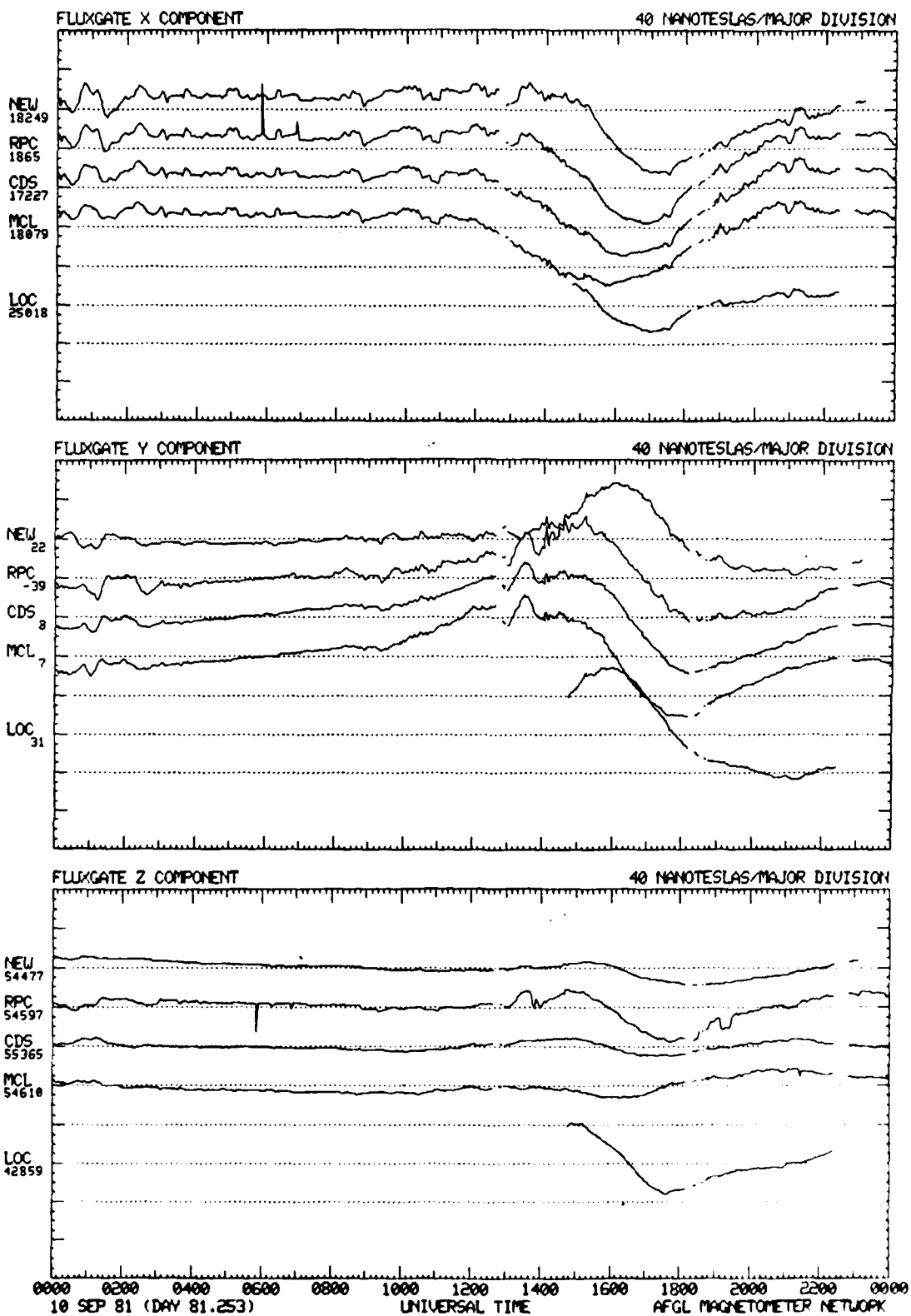


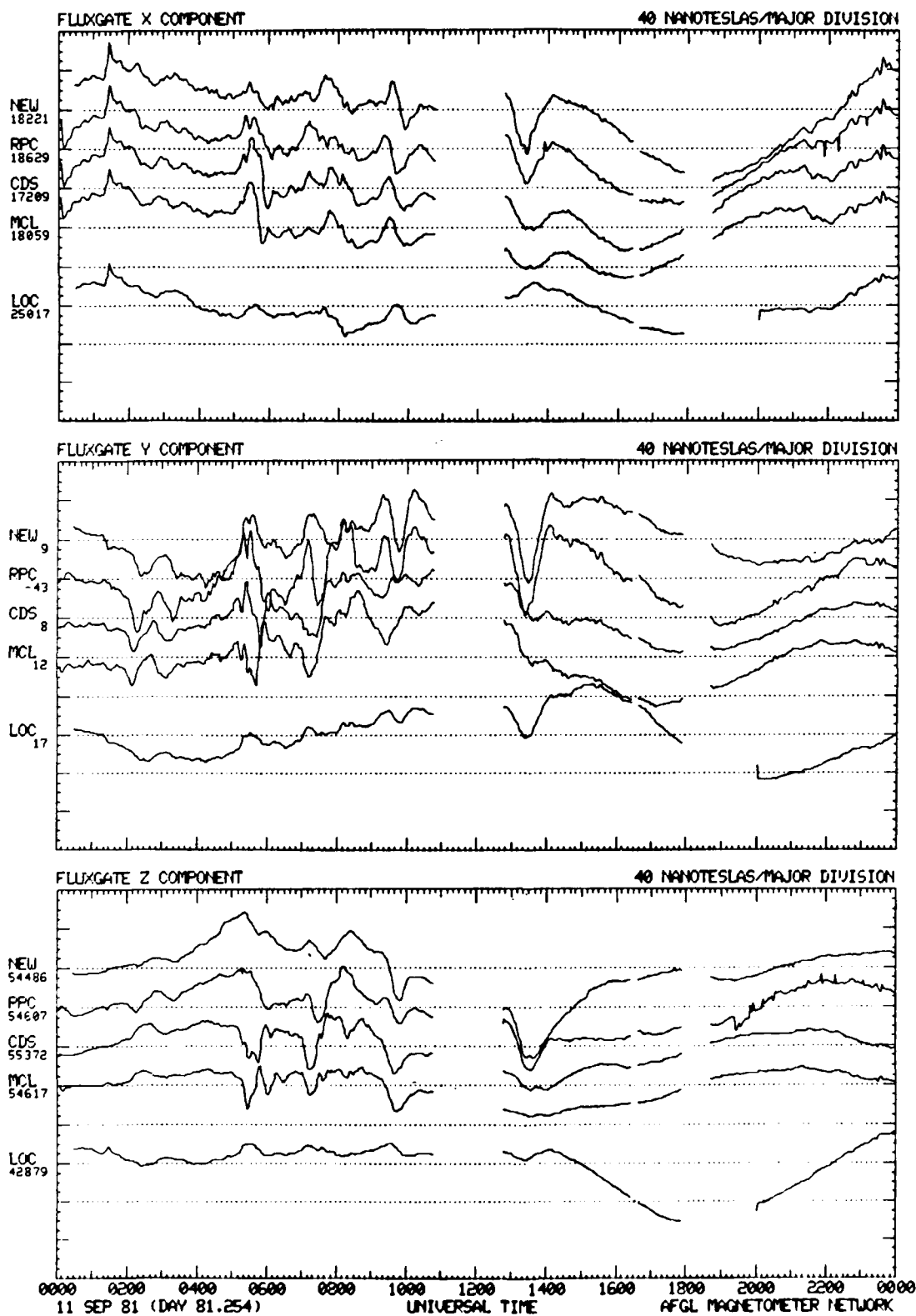


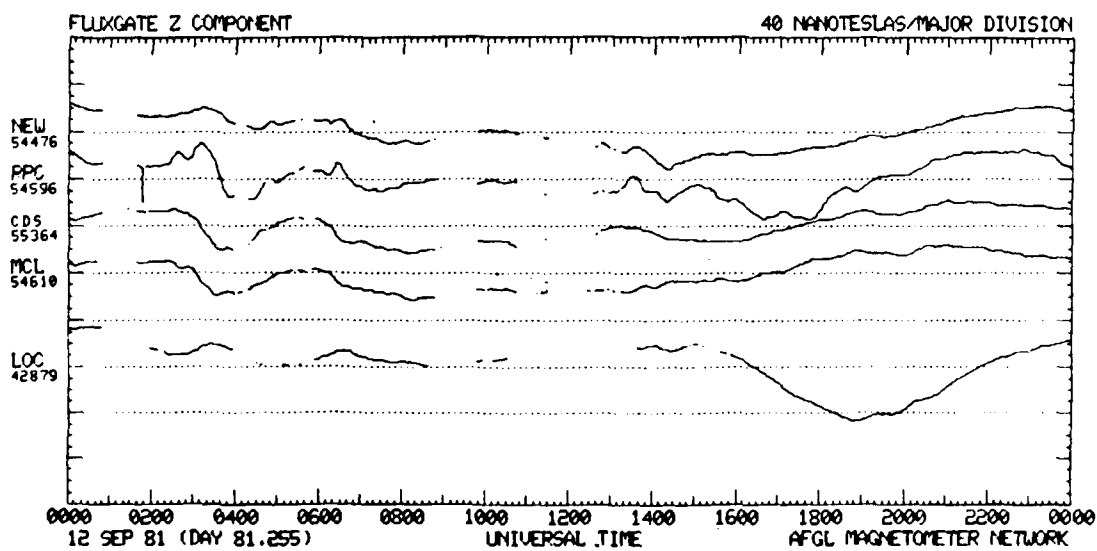
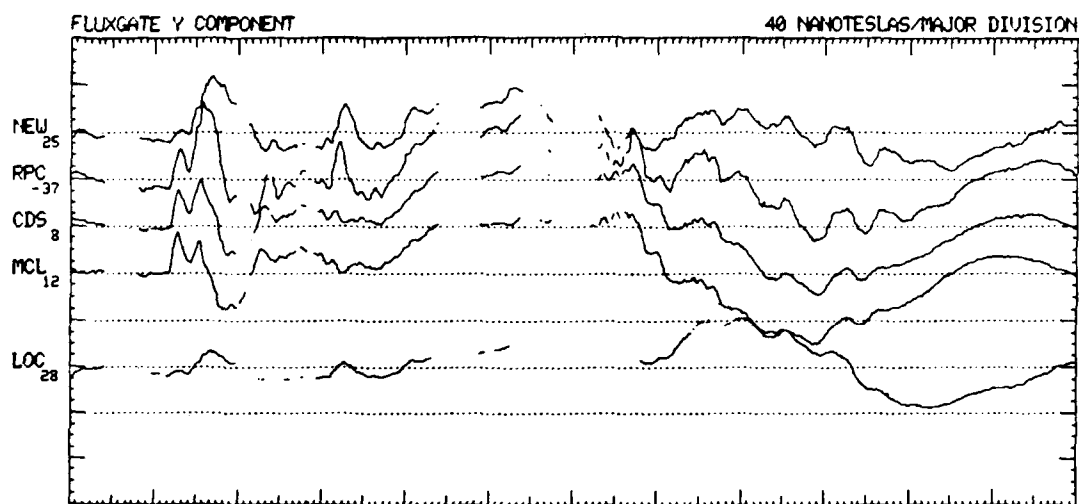
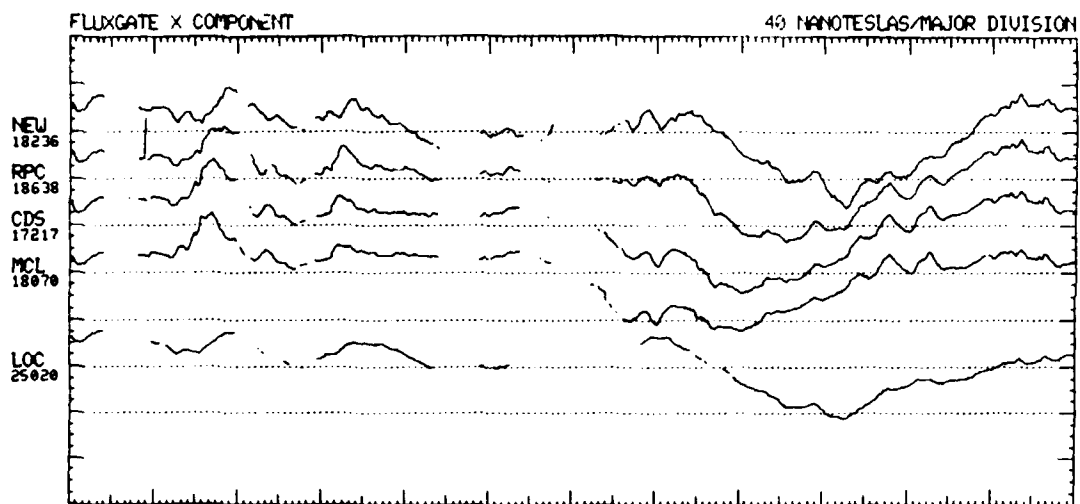


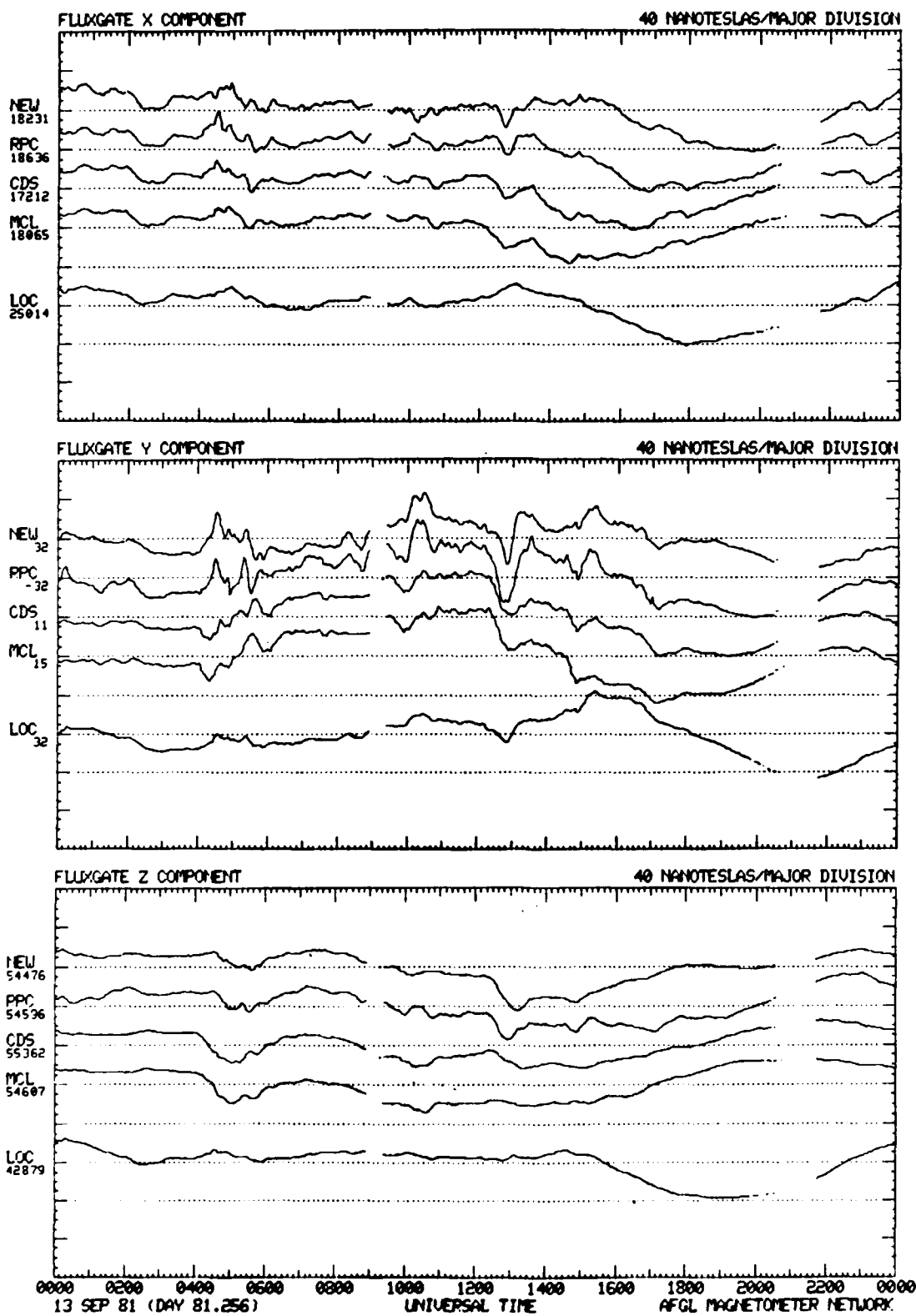


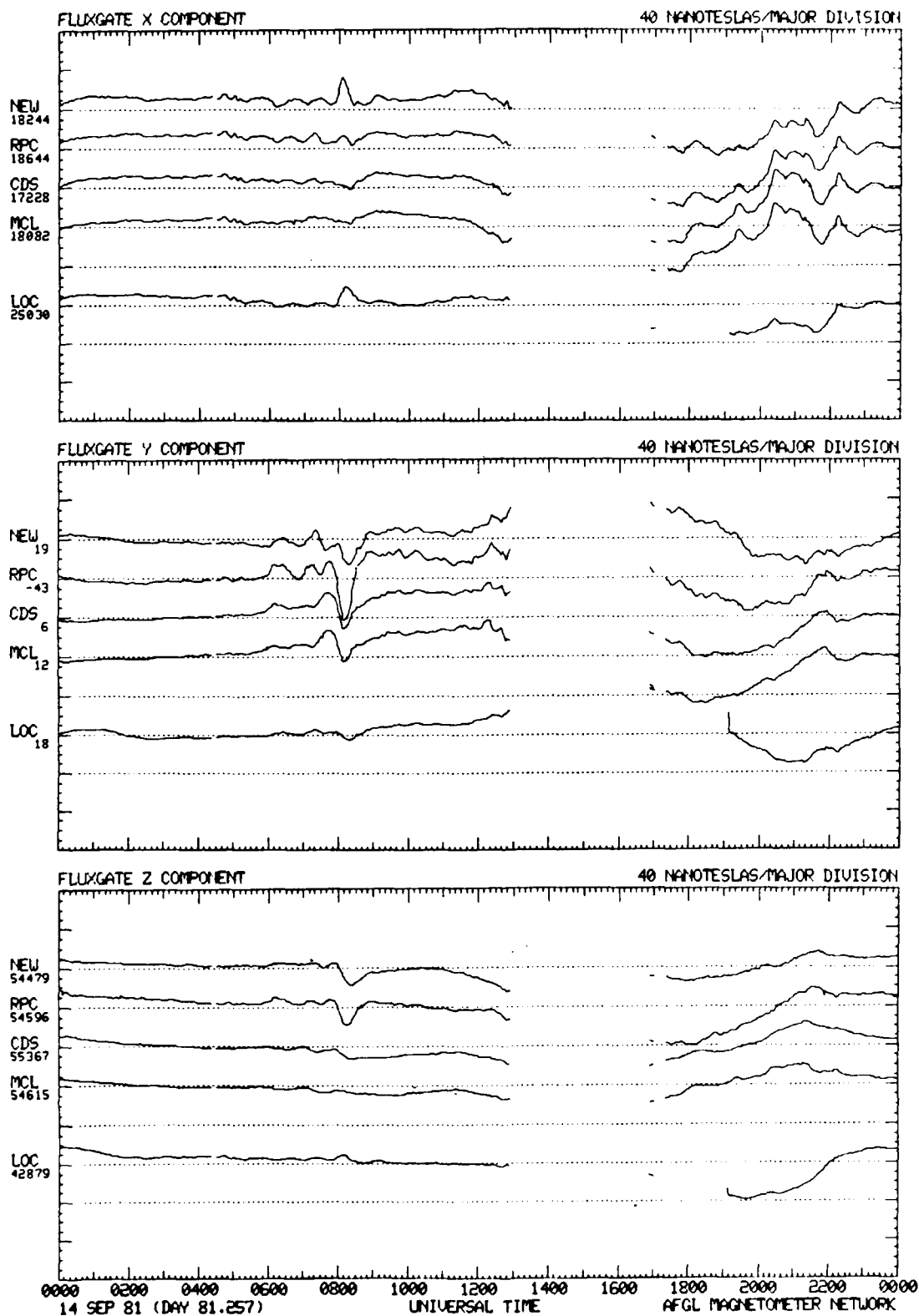


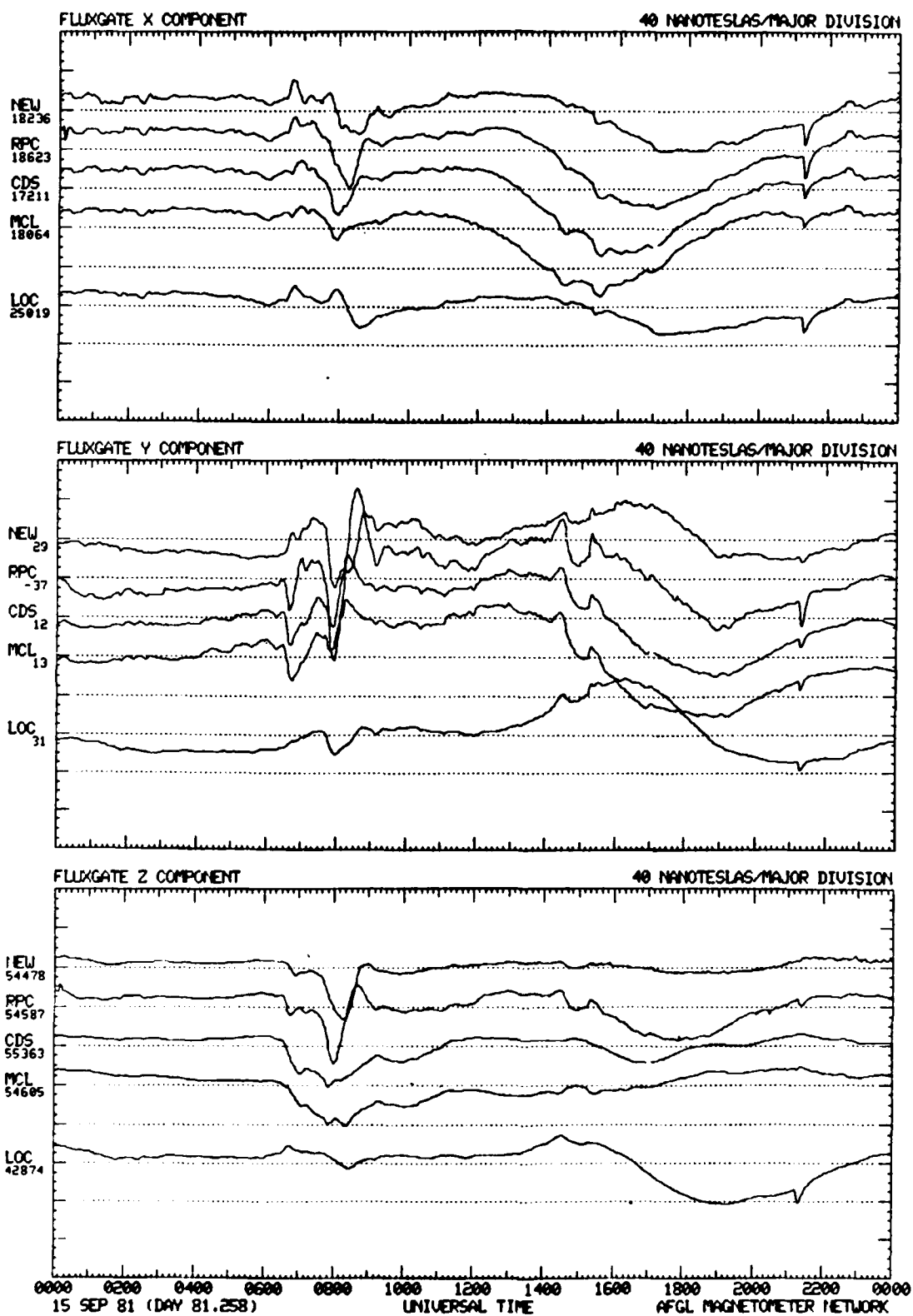




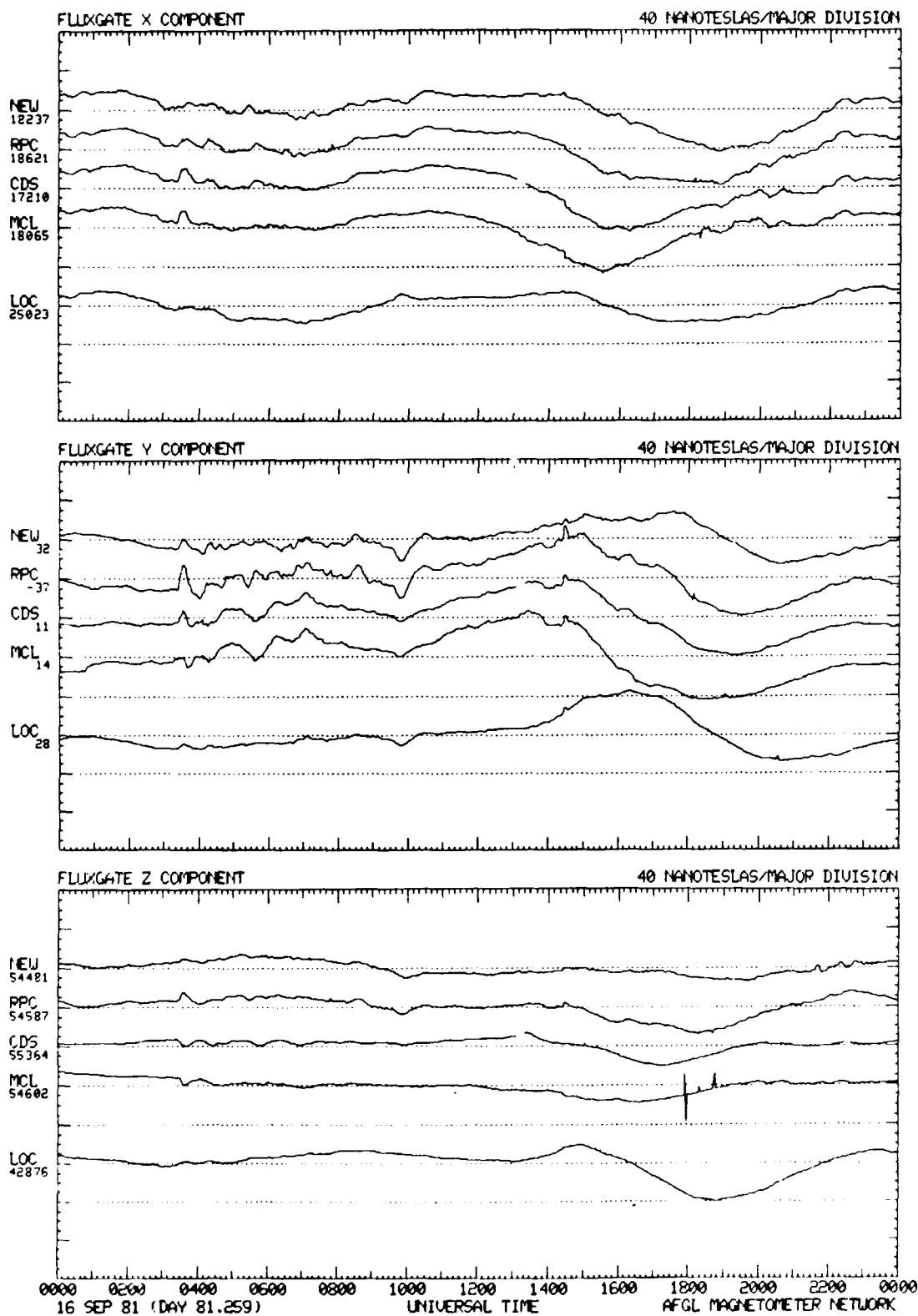


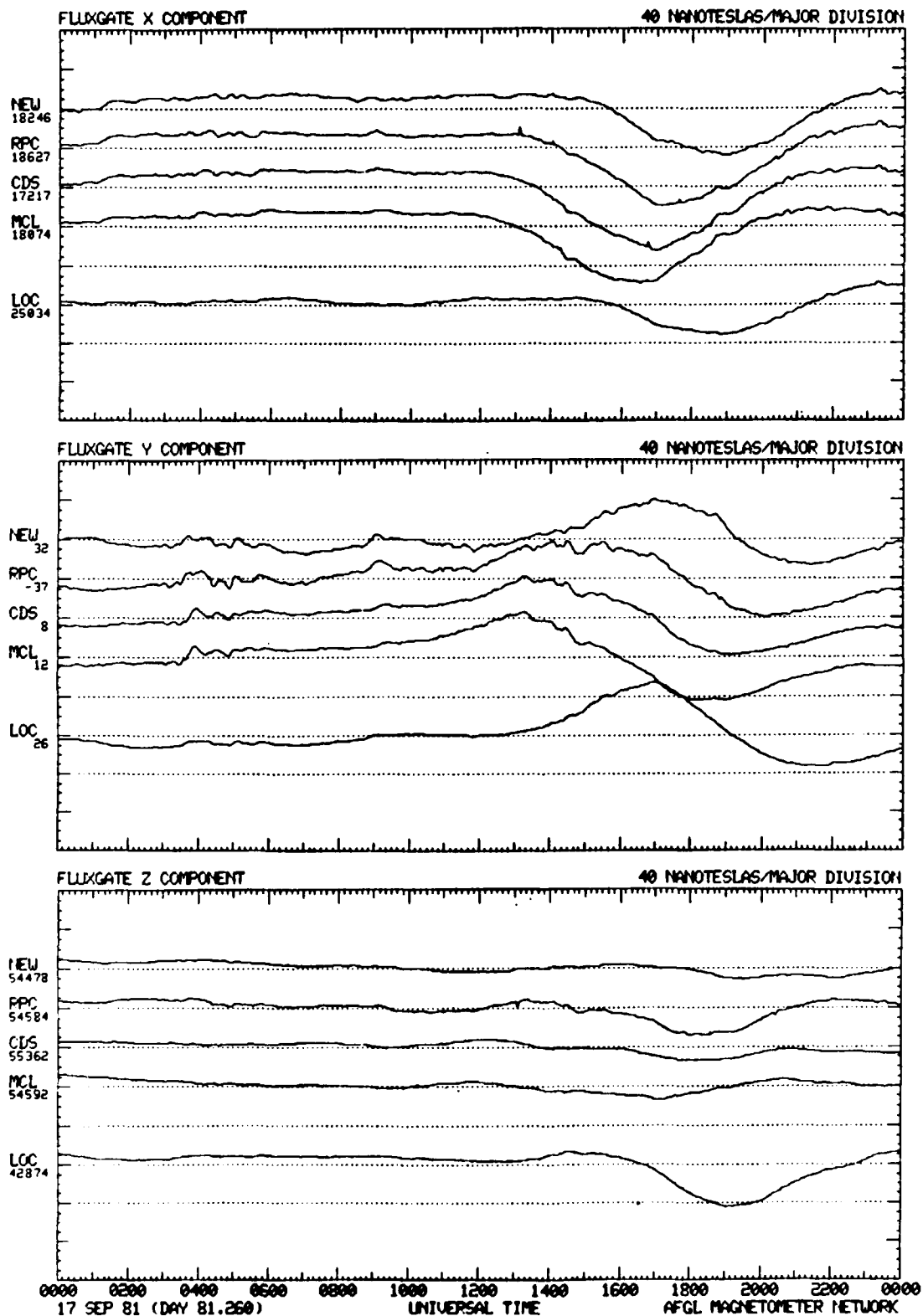


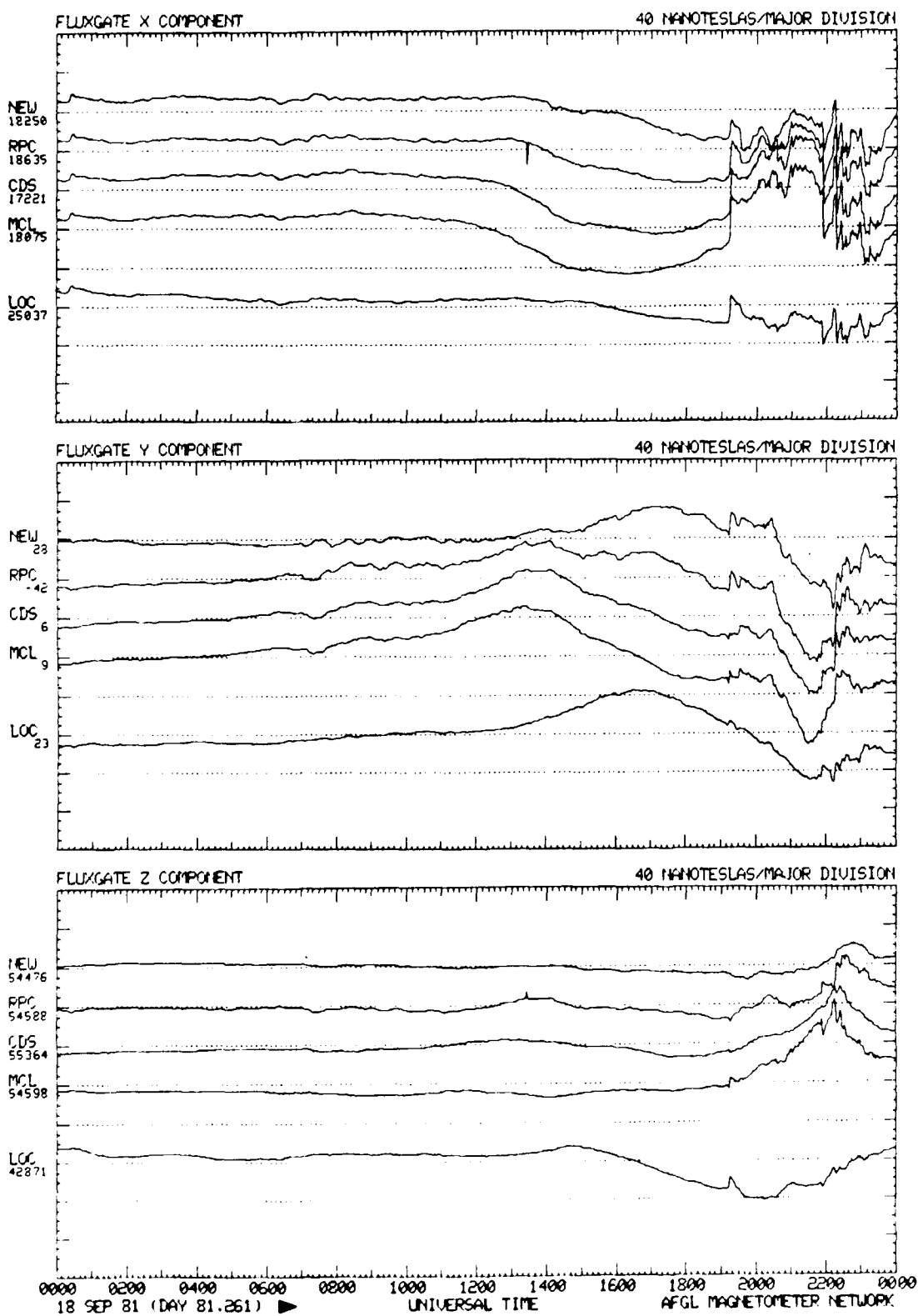


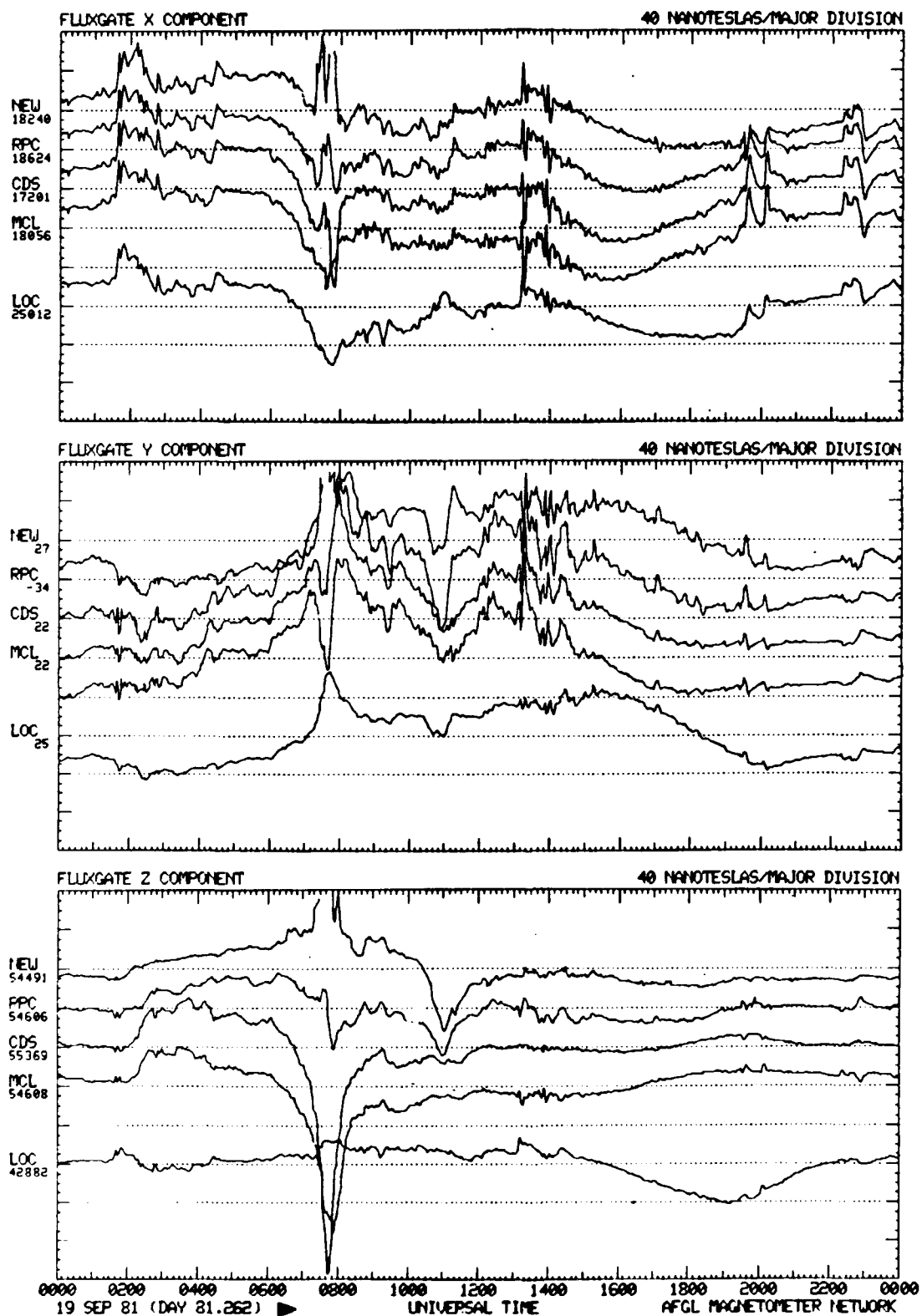


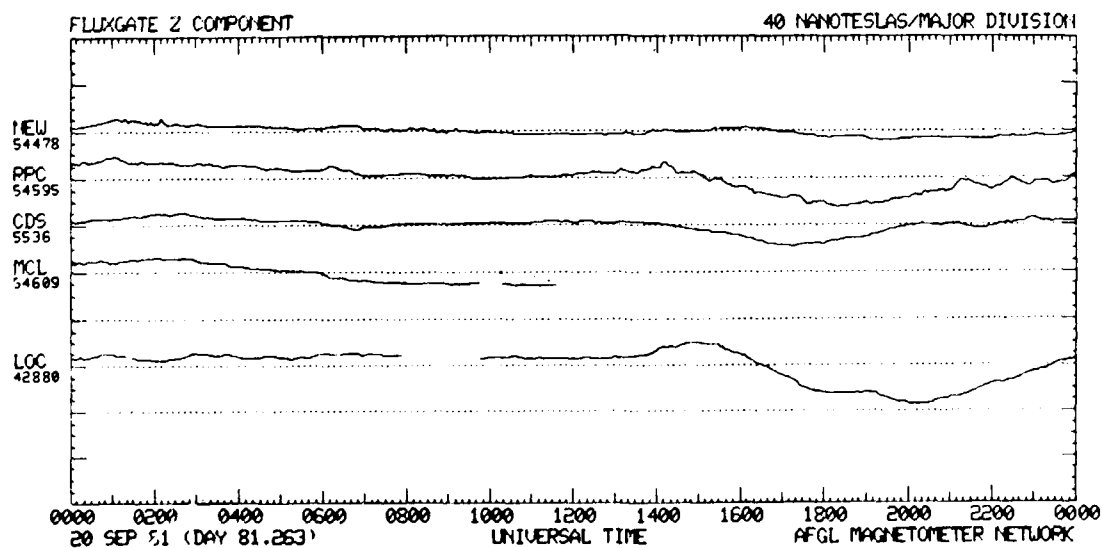
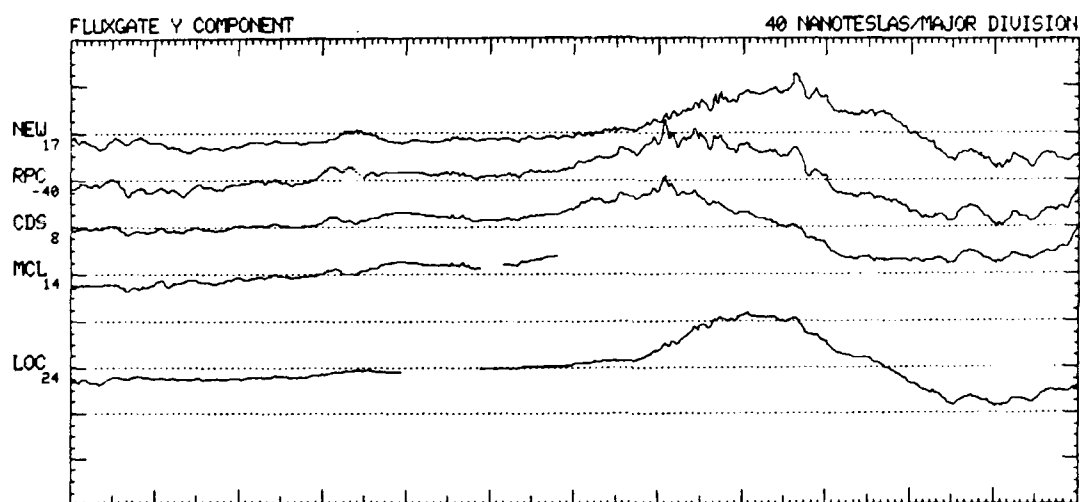
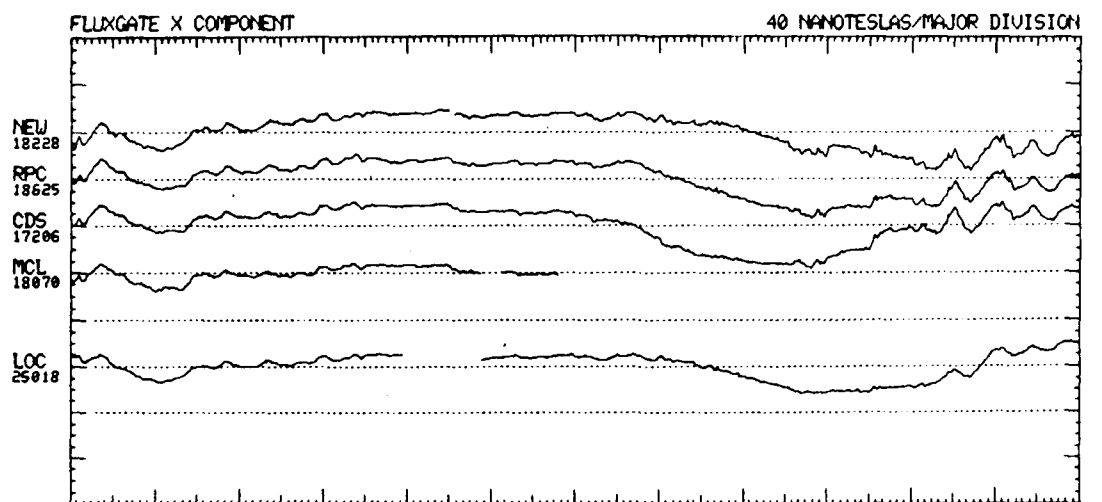


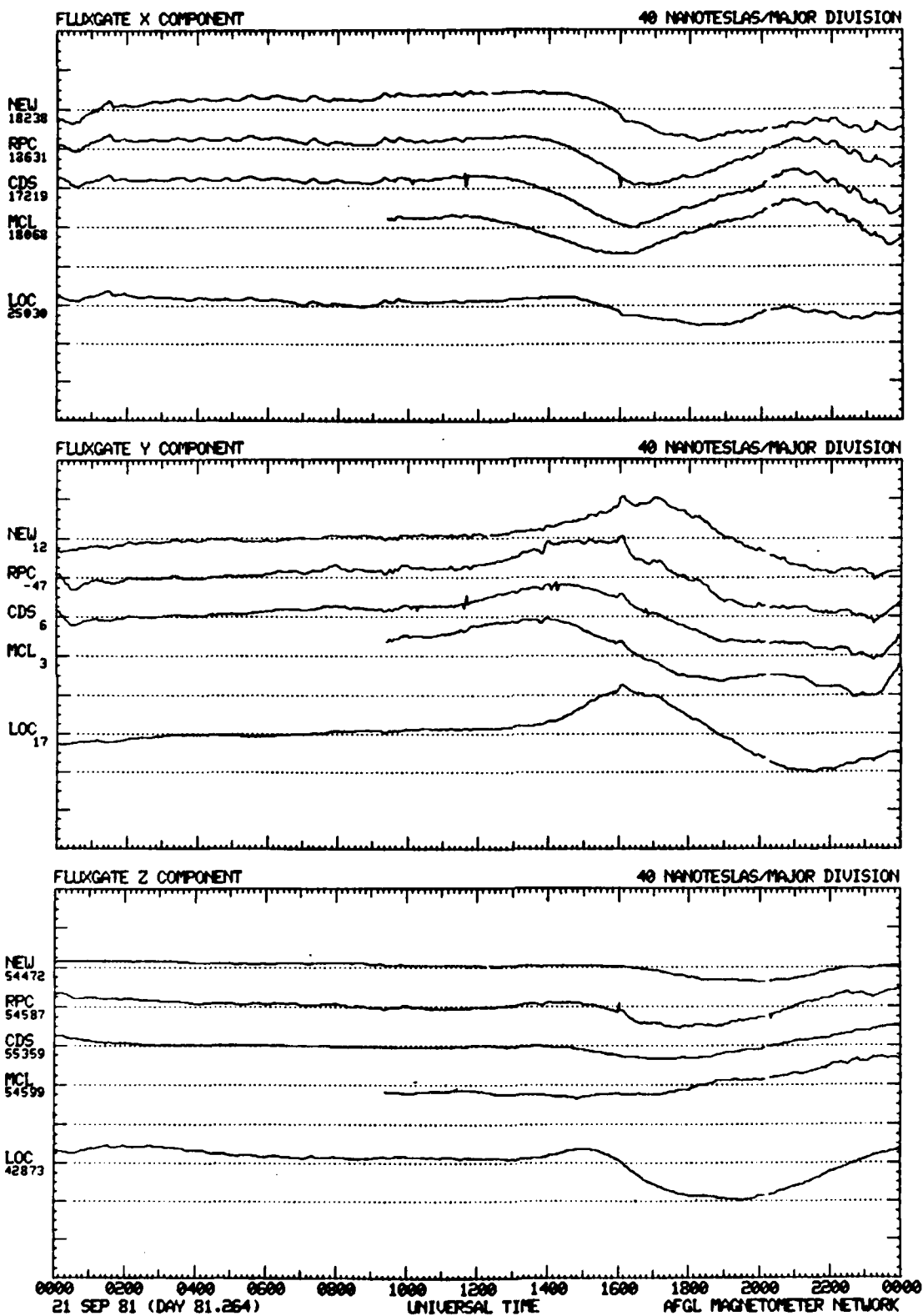


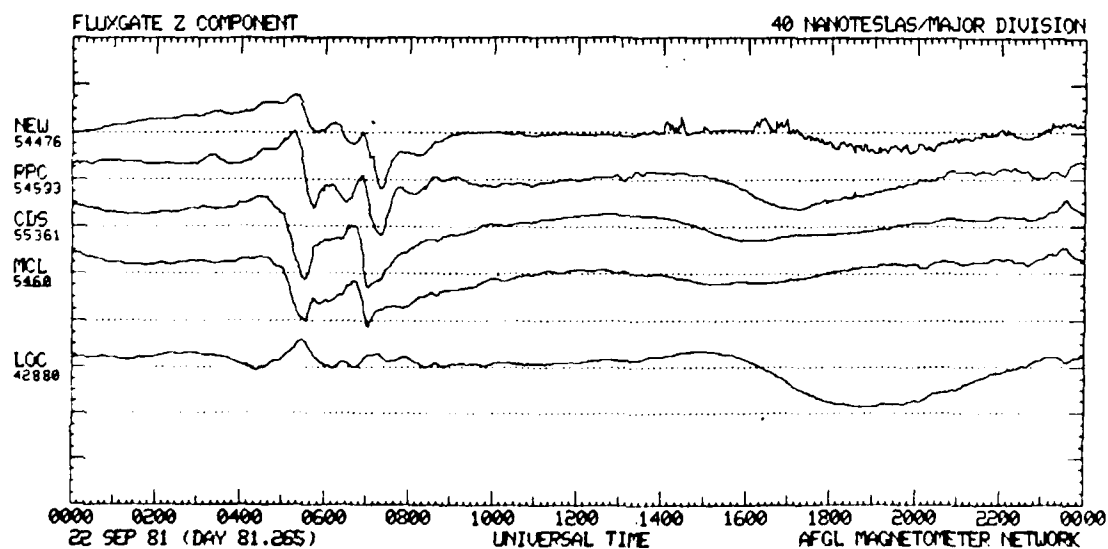
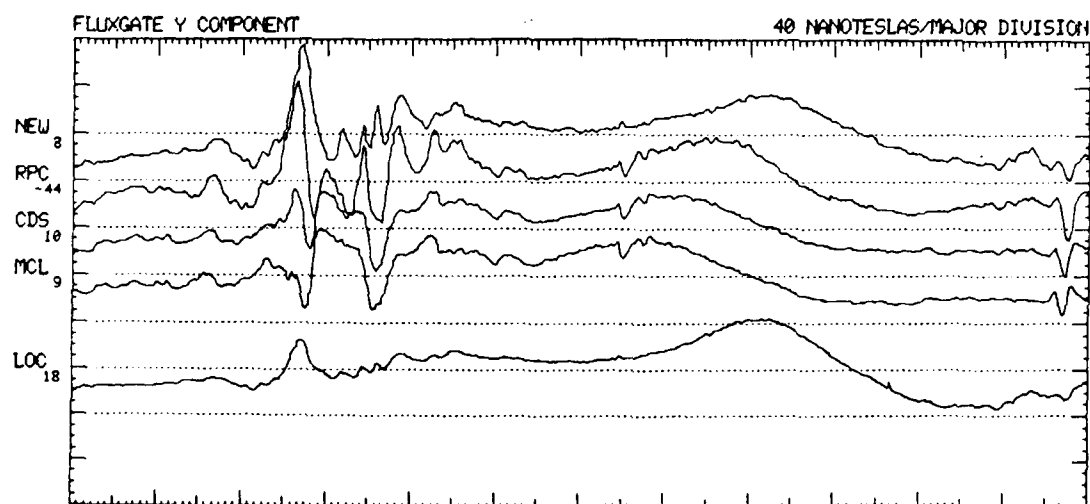
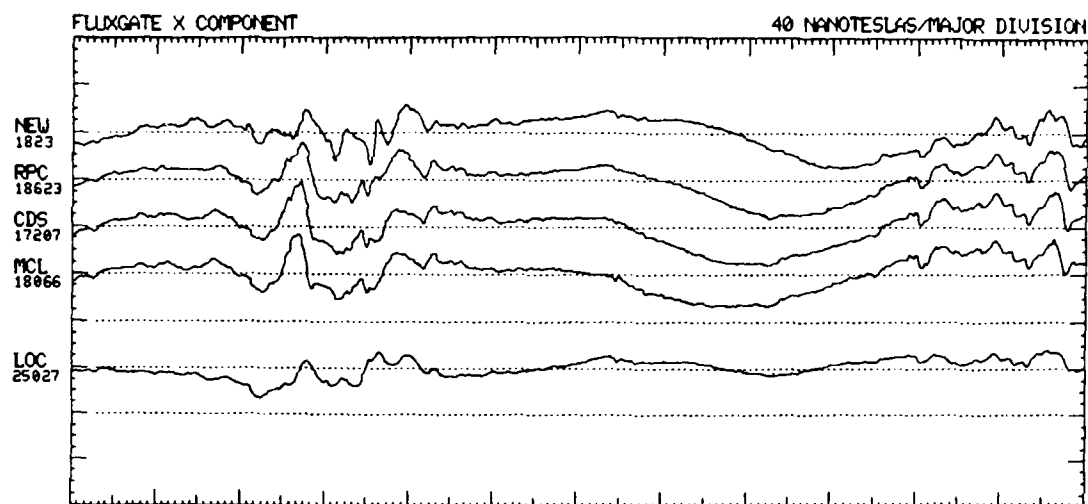


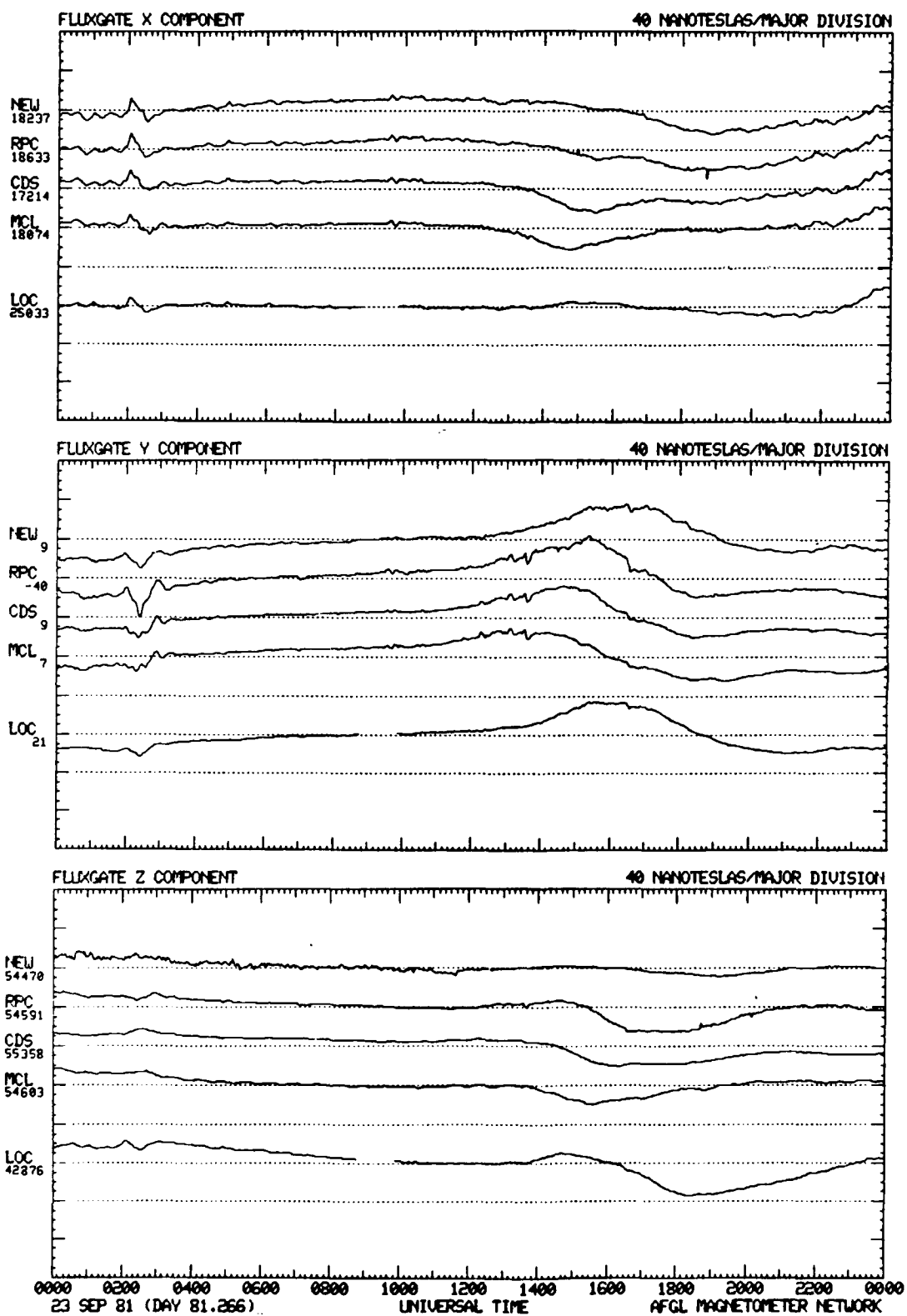




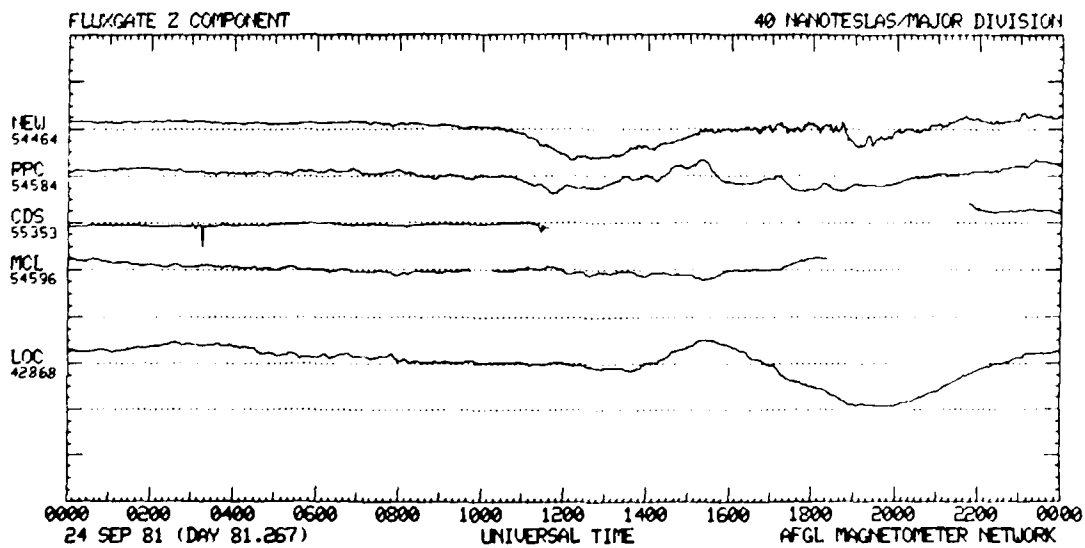
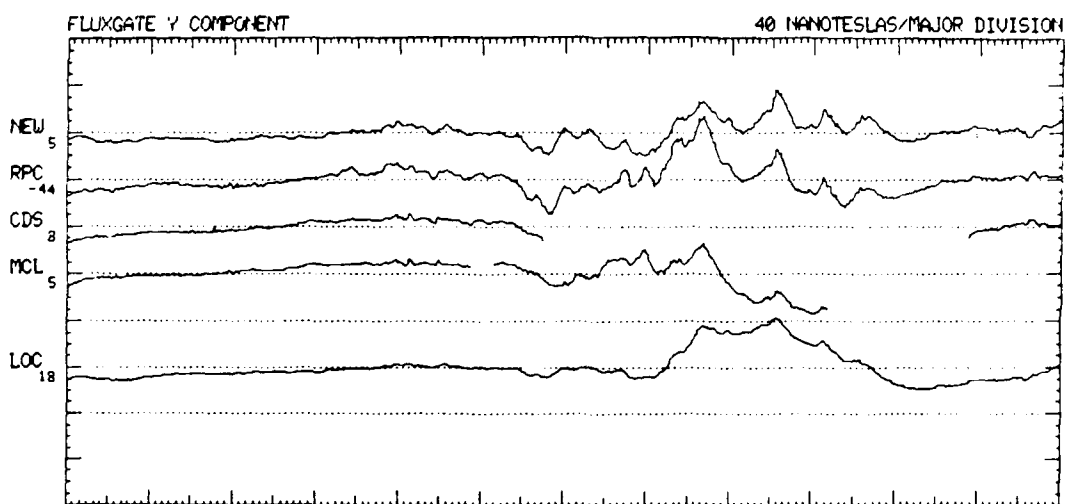
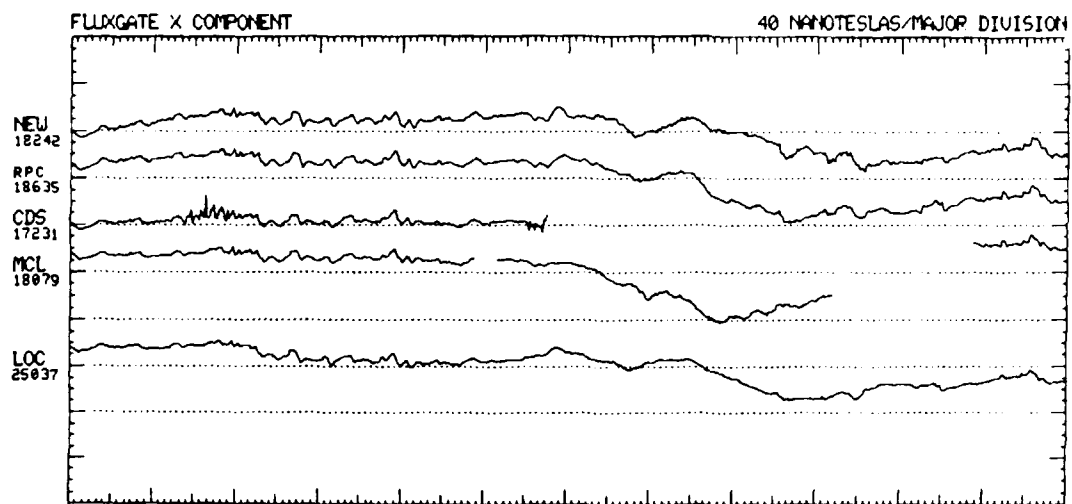


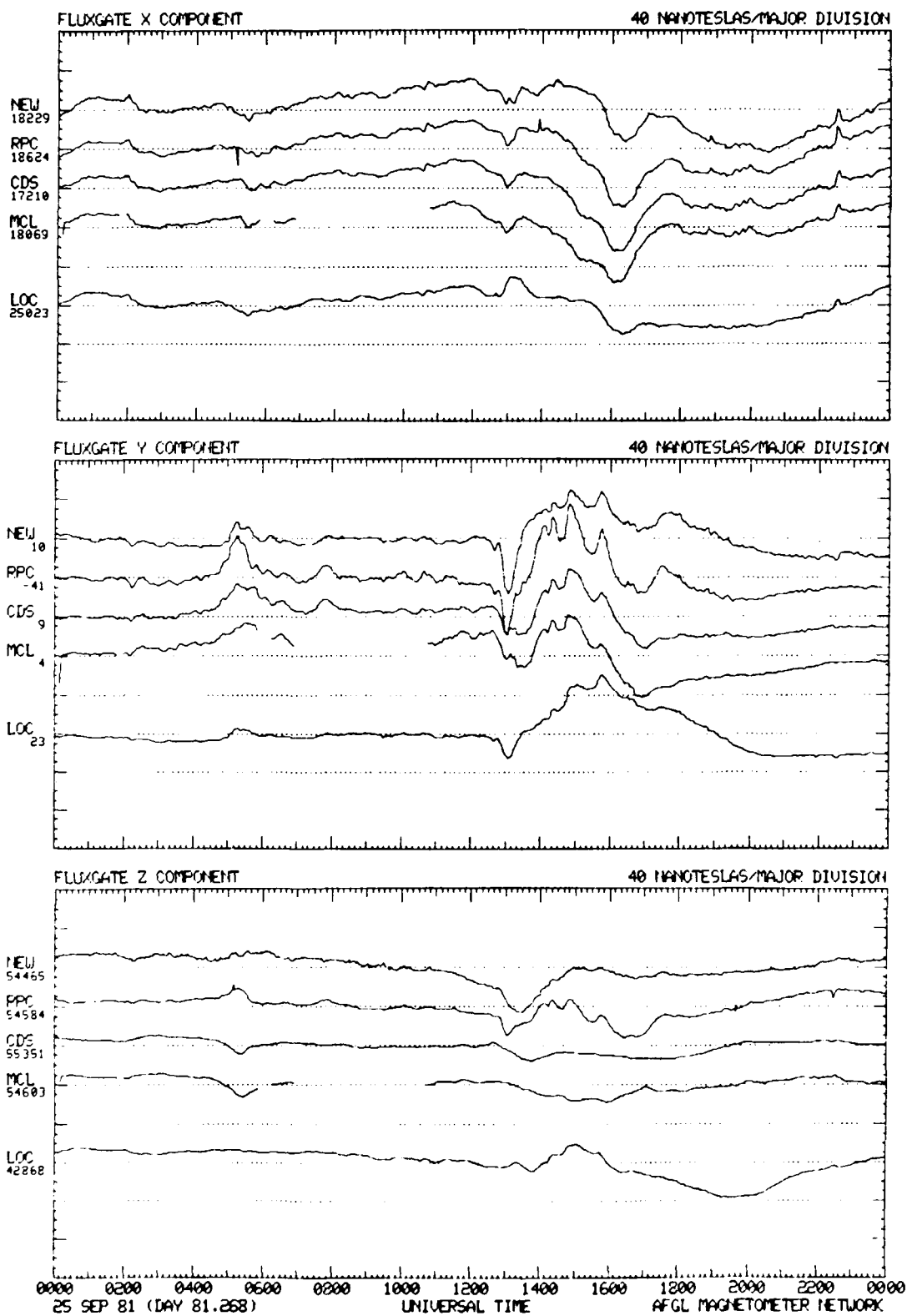


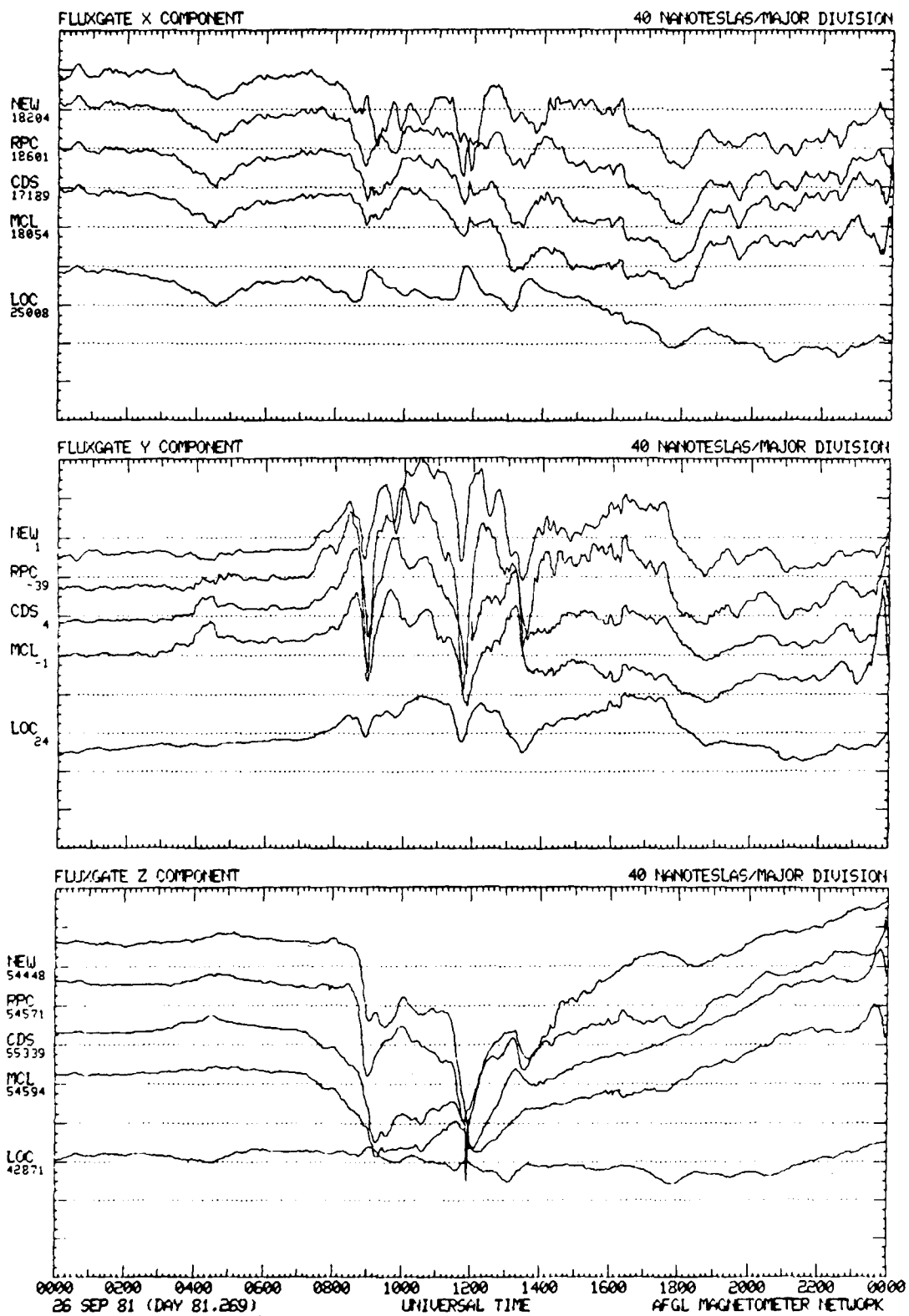


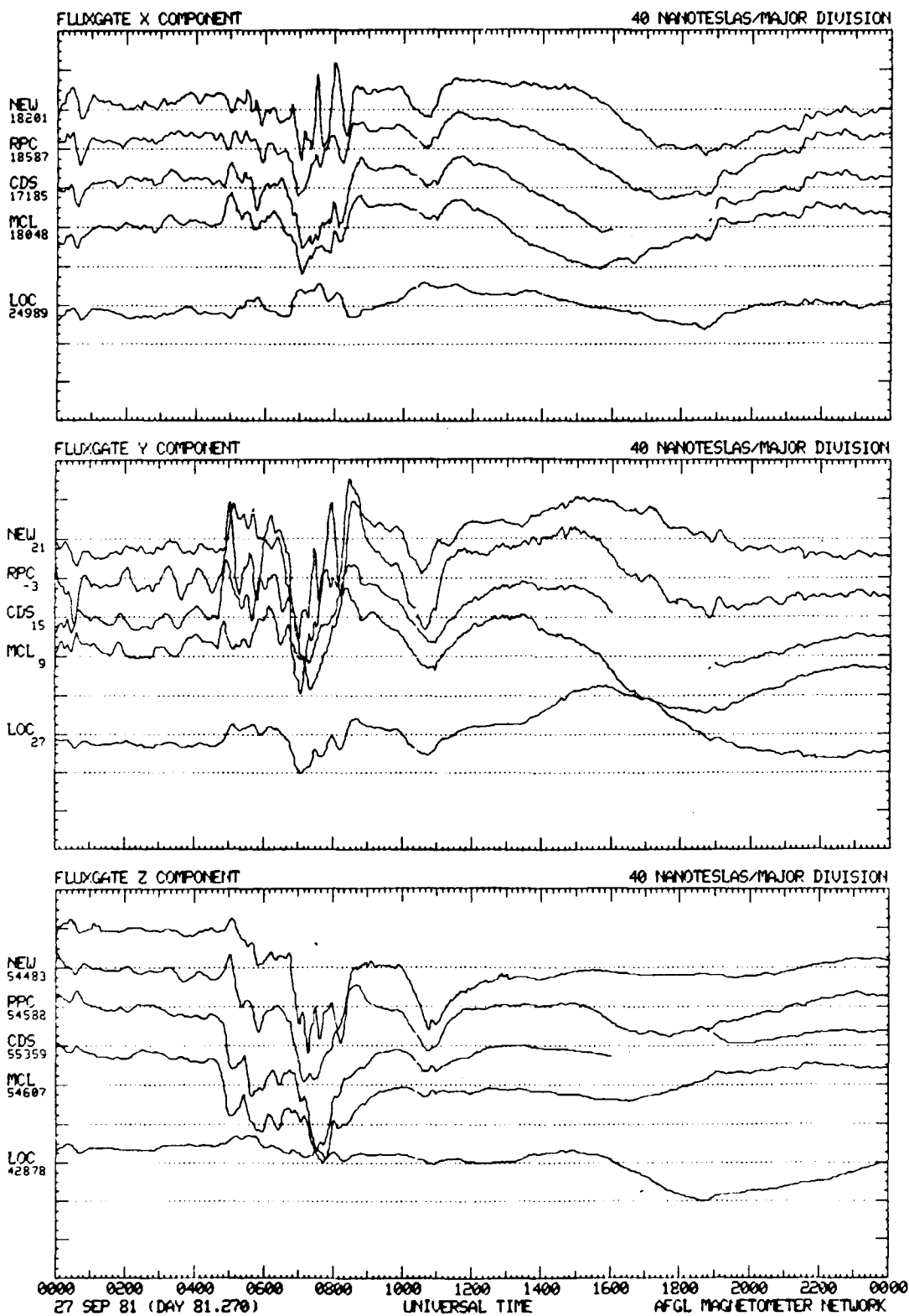


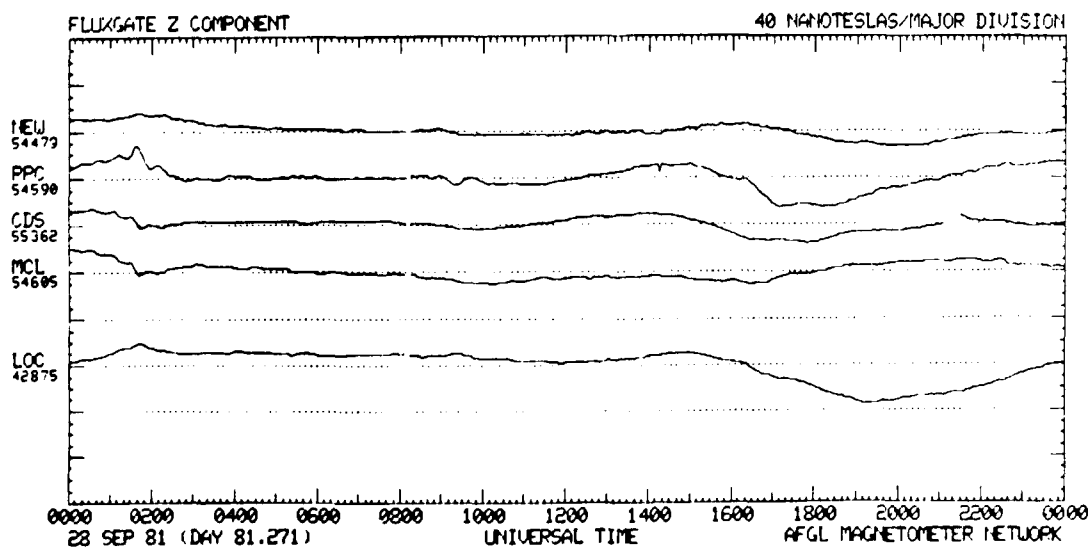
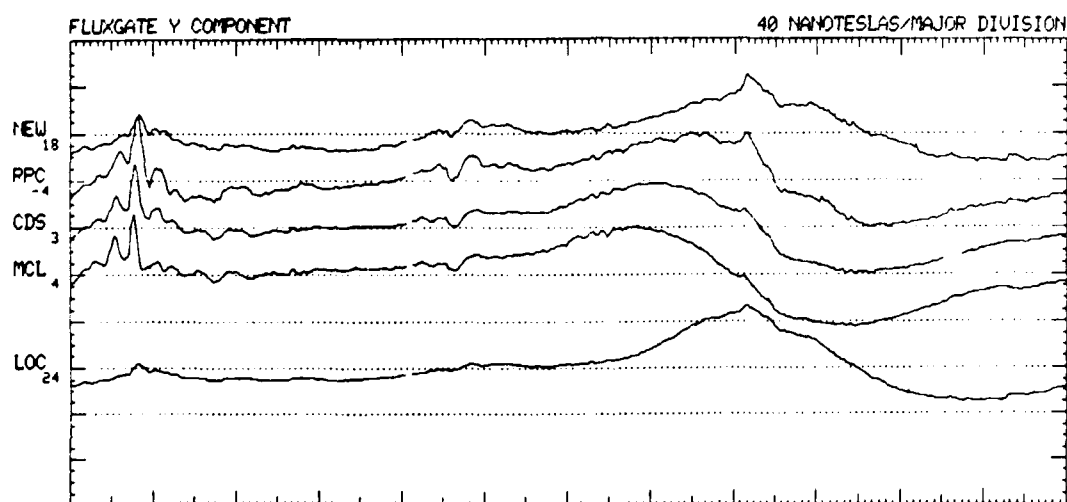
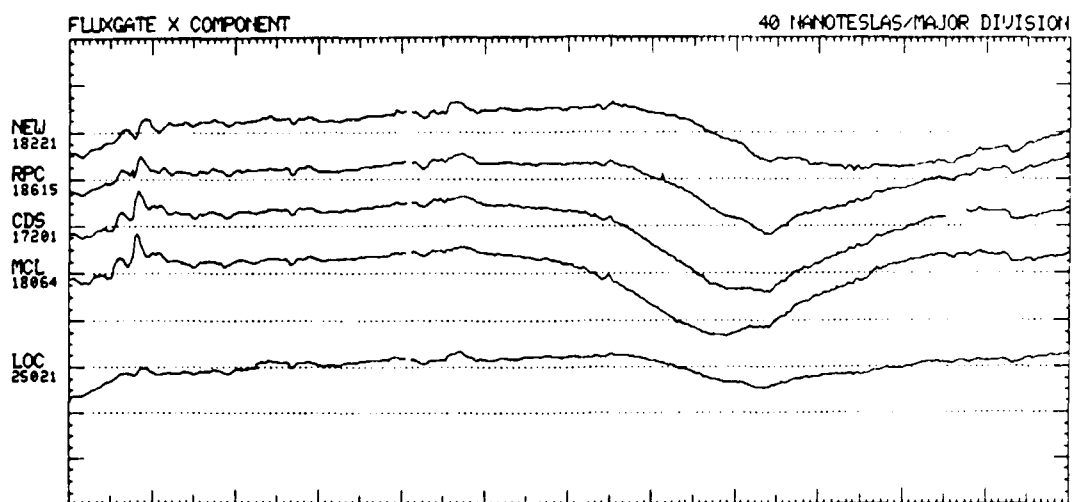




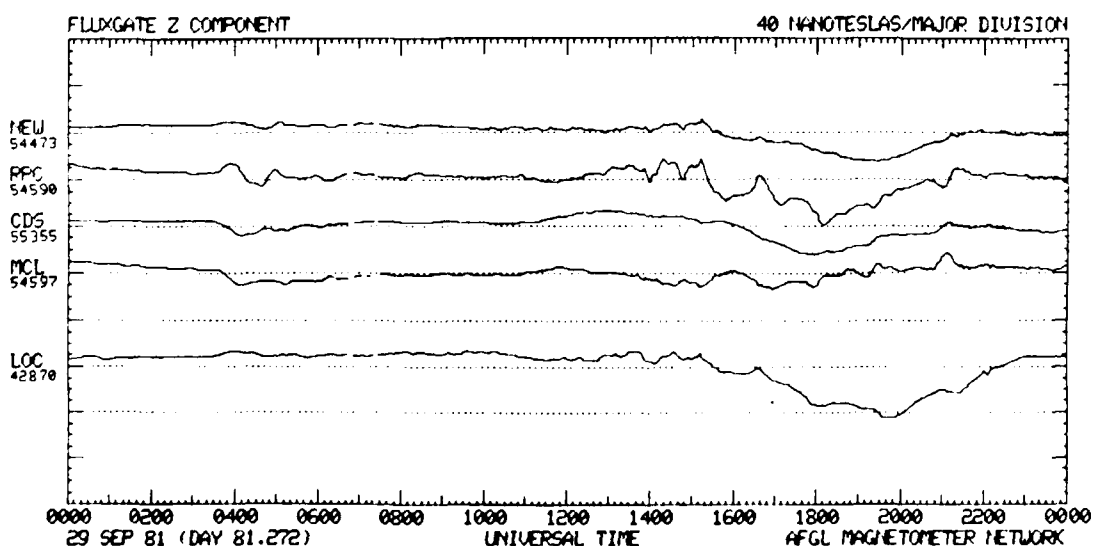
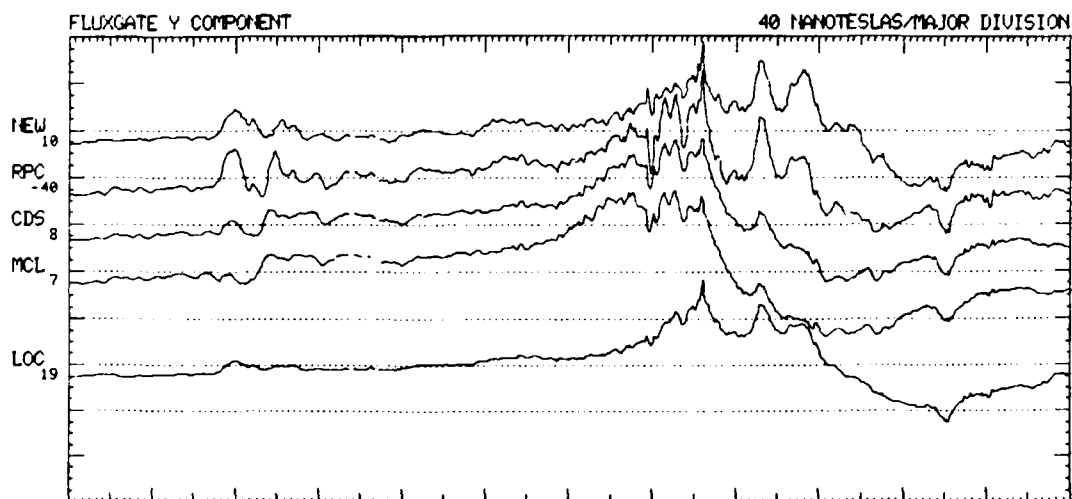
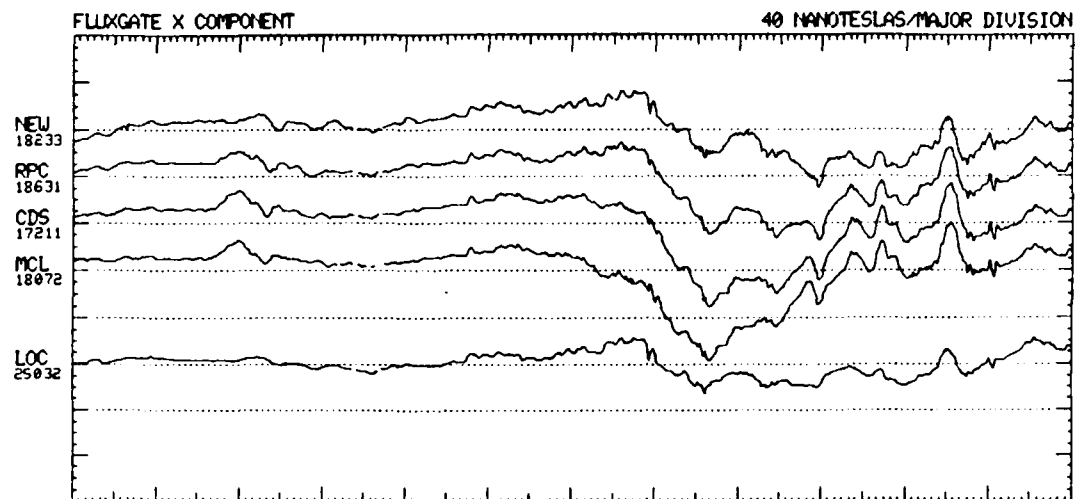




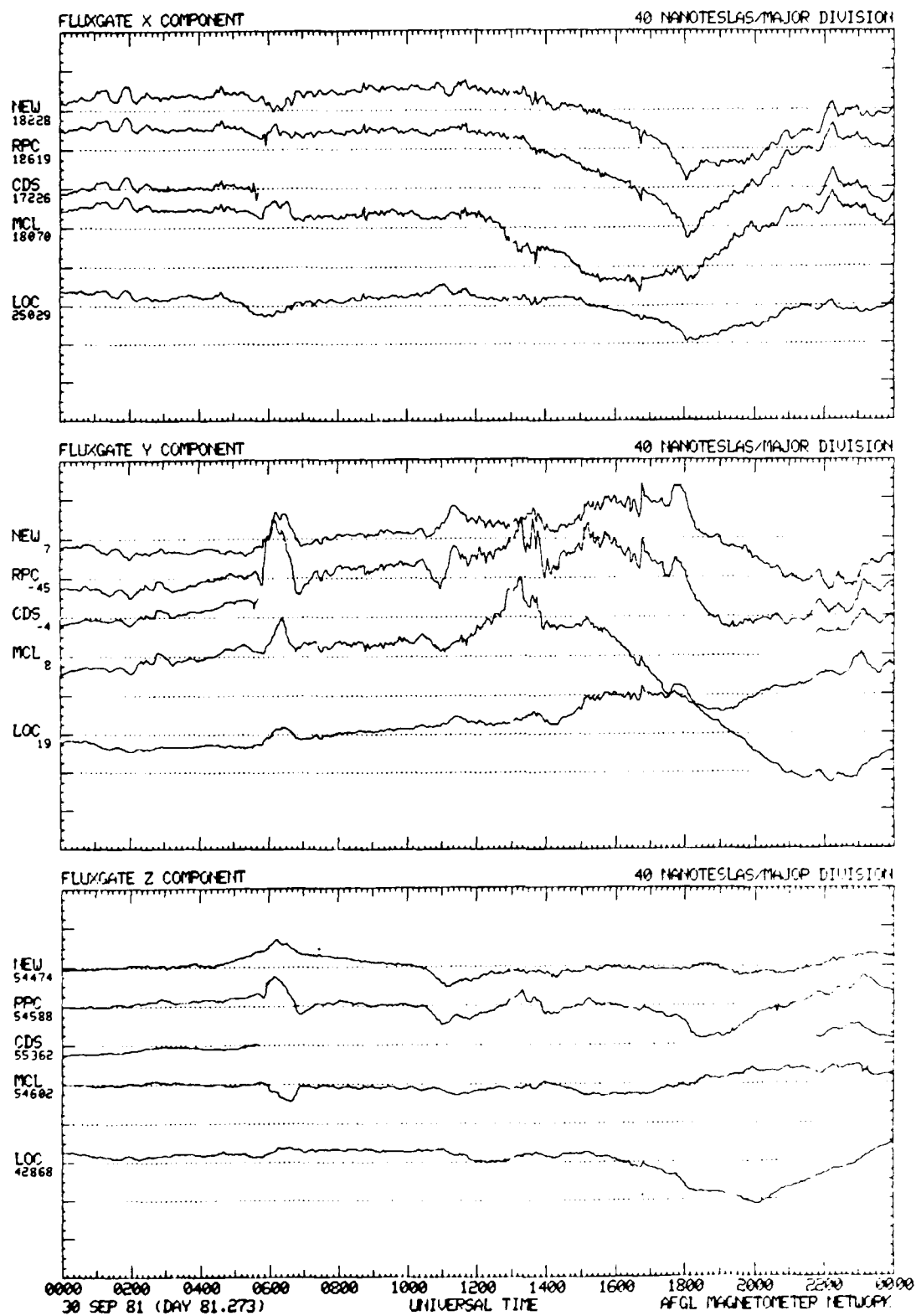


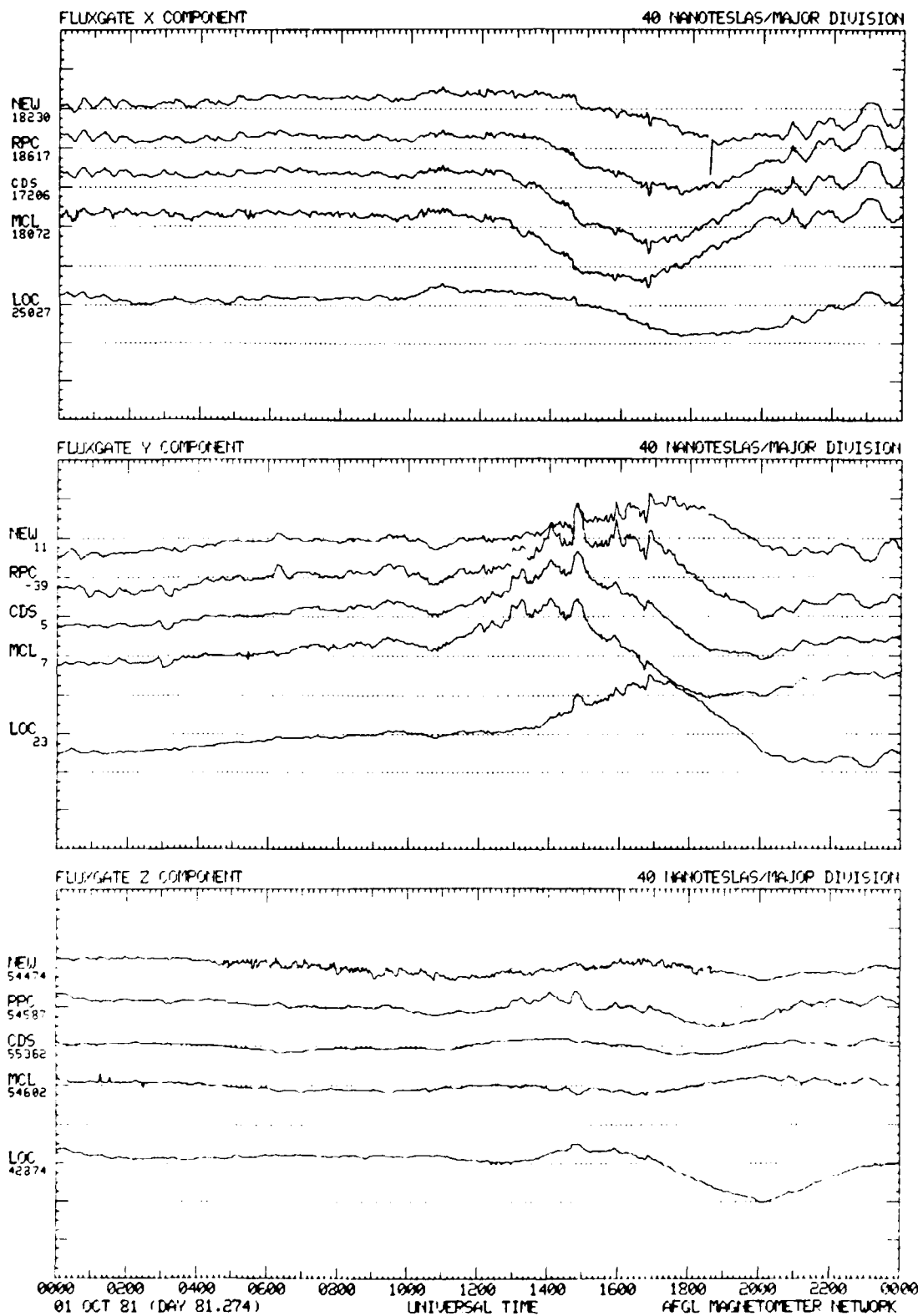


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28 SEP 81 (DAY 81.271) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

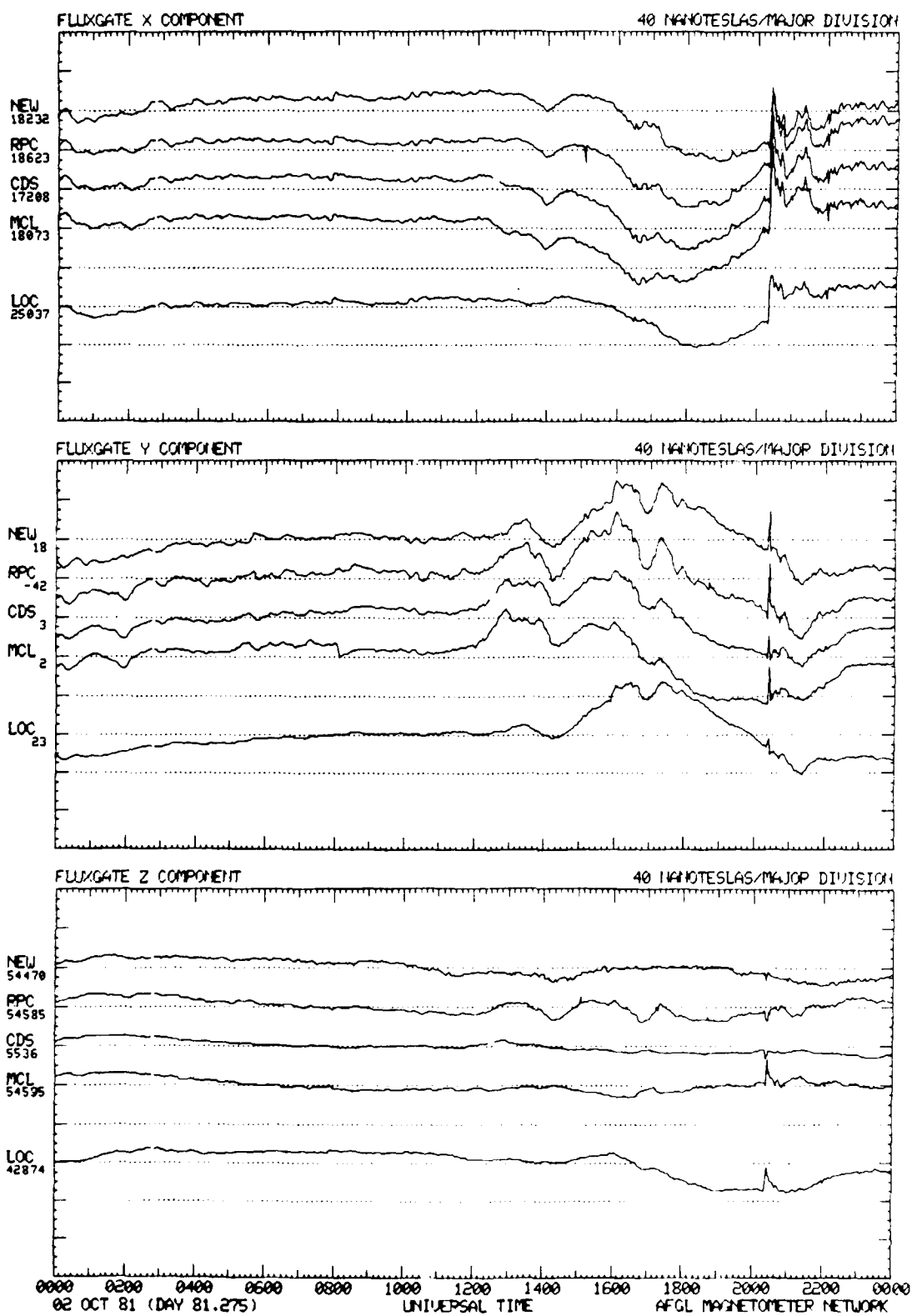


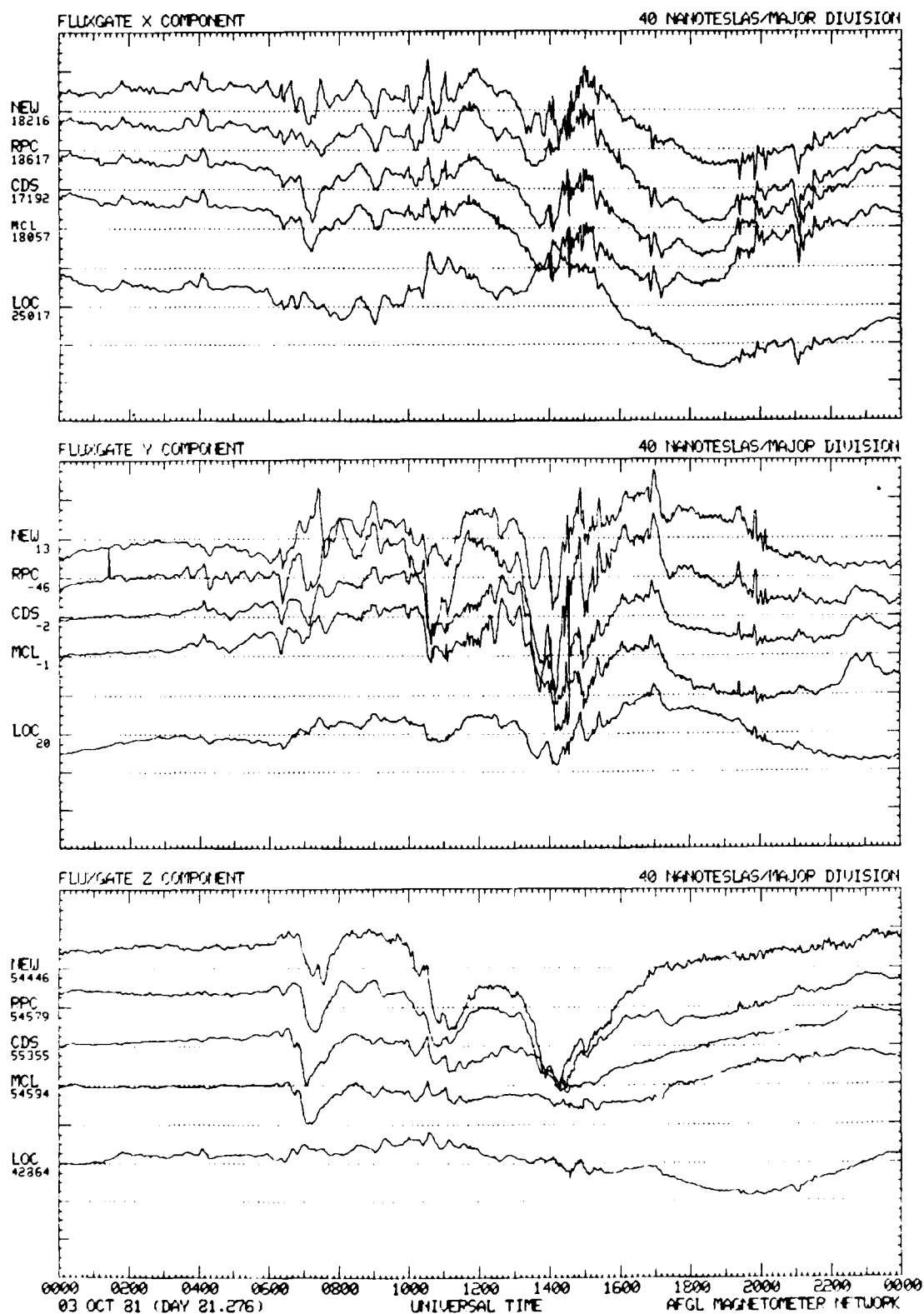
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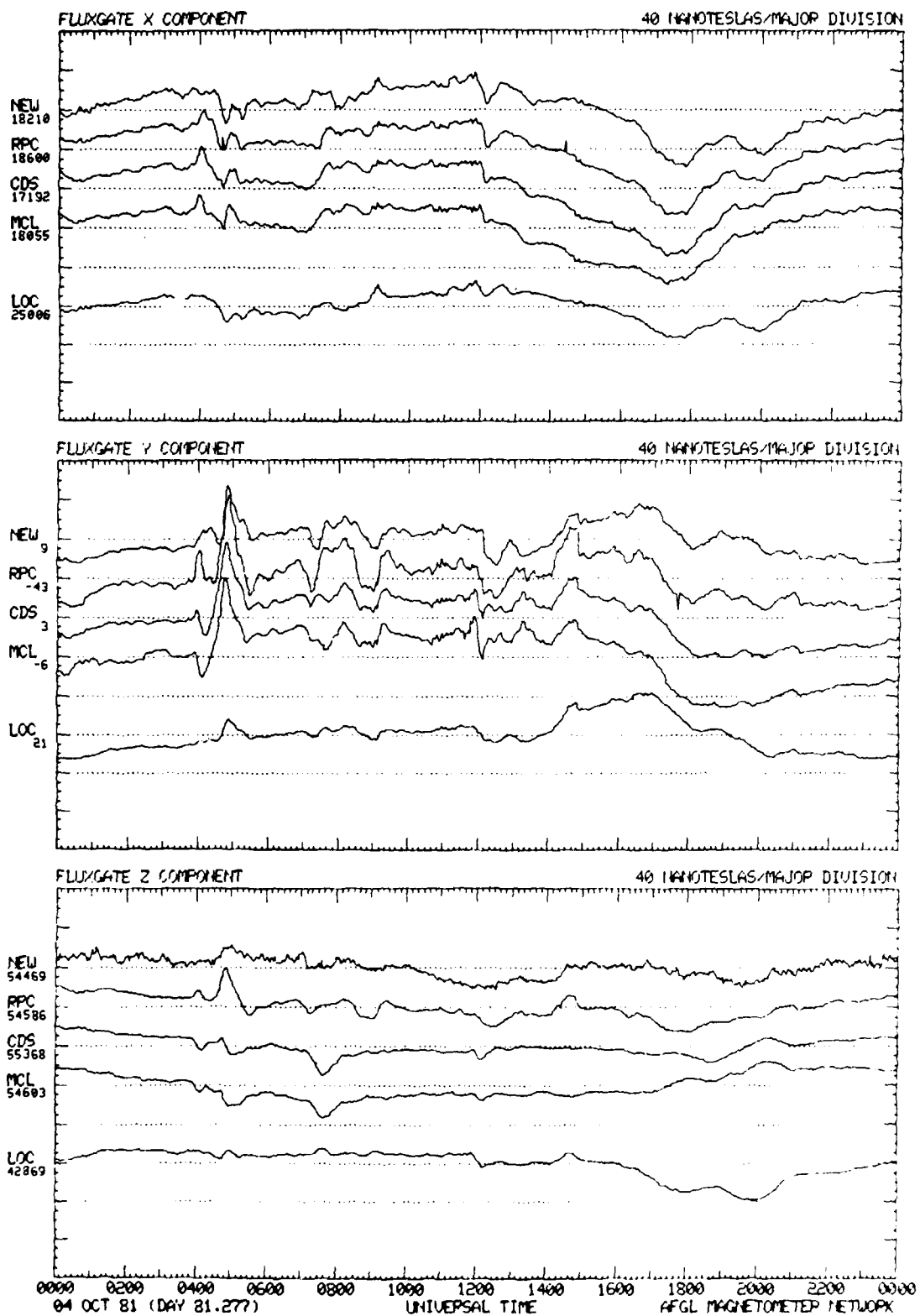
DAILY MAGNETOGRAMS FOR 1981 FROM THE AFGL (AIR FORCE  
GEOPHYSICS LABORATORY) NETWORK(U) AIR FORCE GEOPHYSICS  
LAB HANSCOM AFB MA D J KNECHT 28 FEB 85 F/G 4/1  
AFGL-TR-85-0030

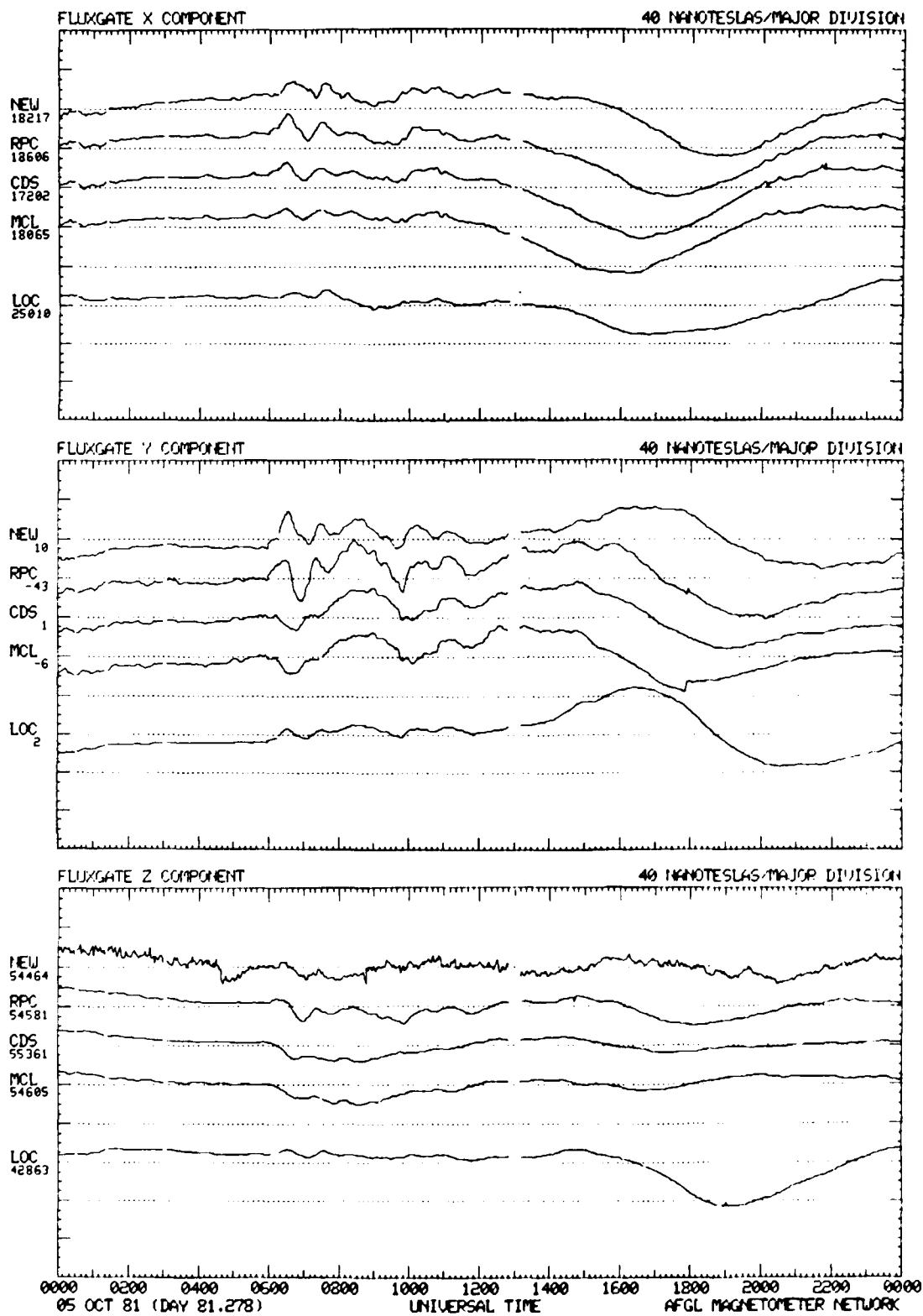
UNCLASSIFIED

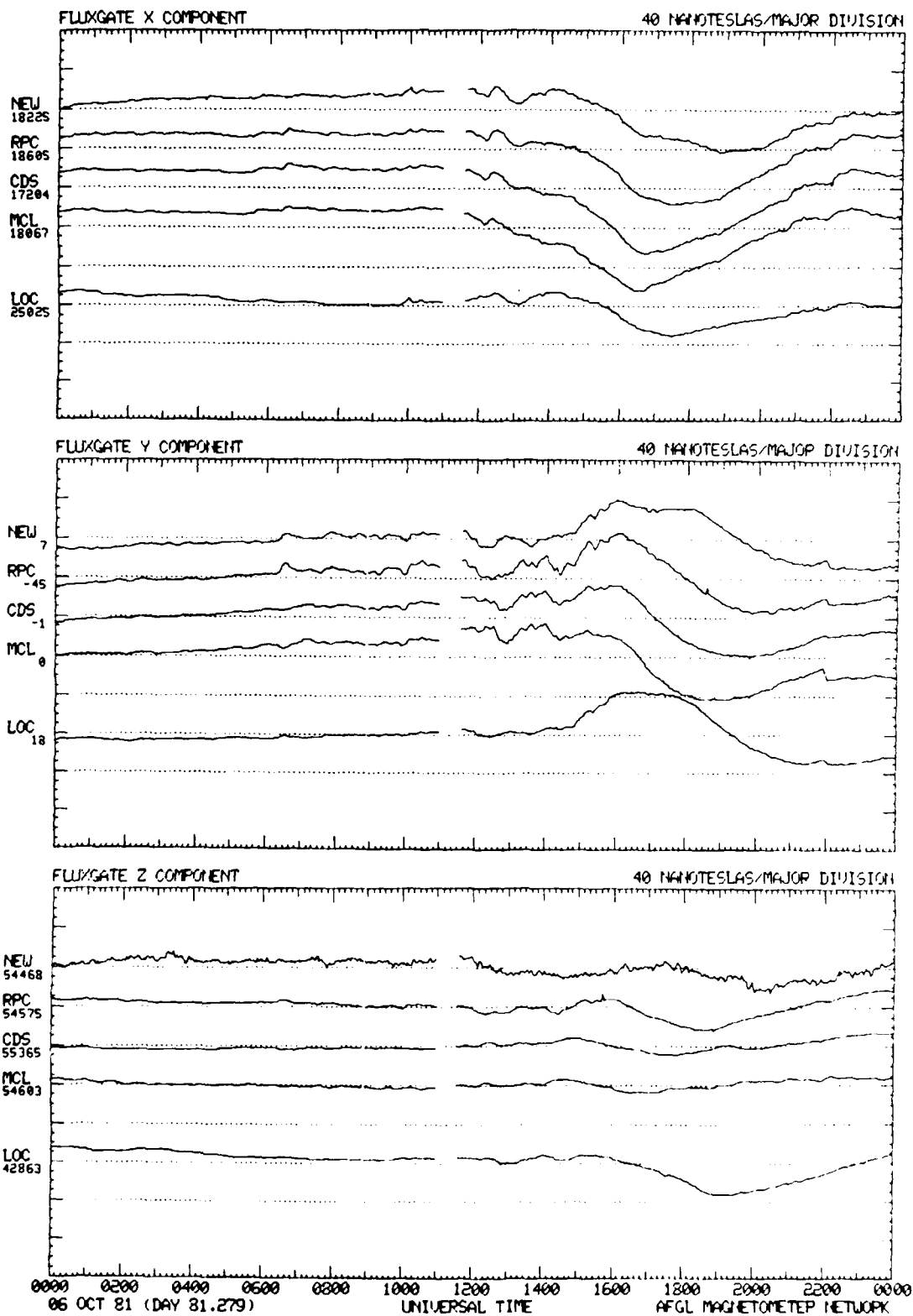
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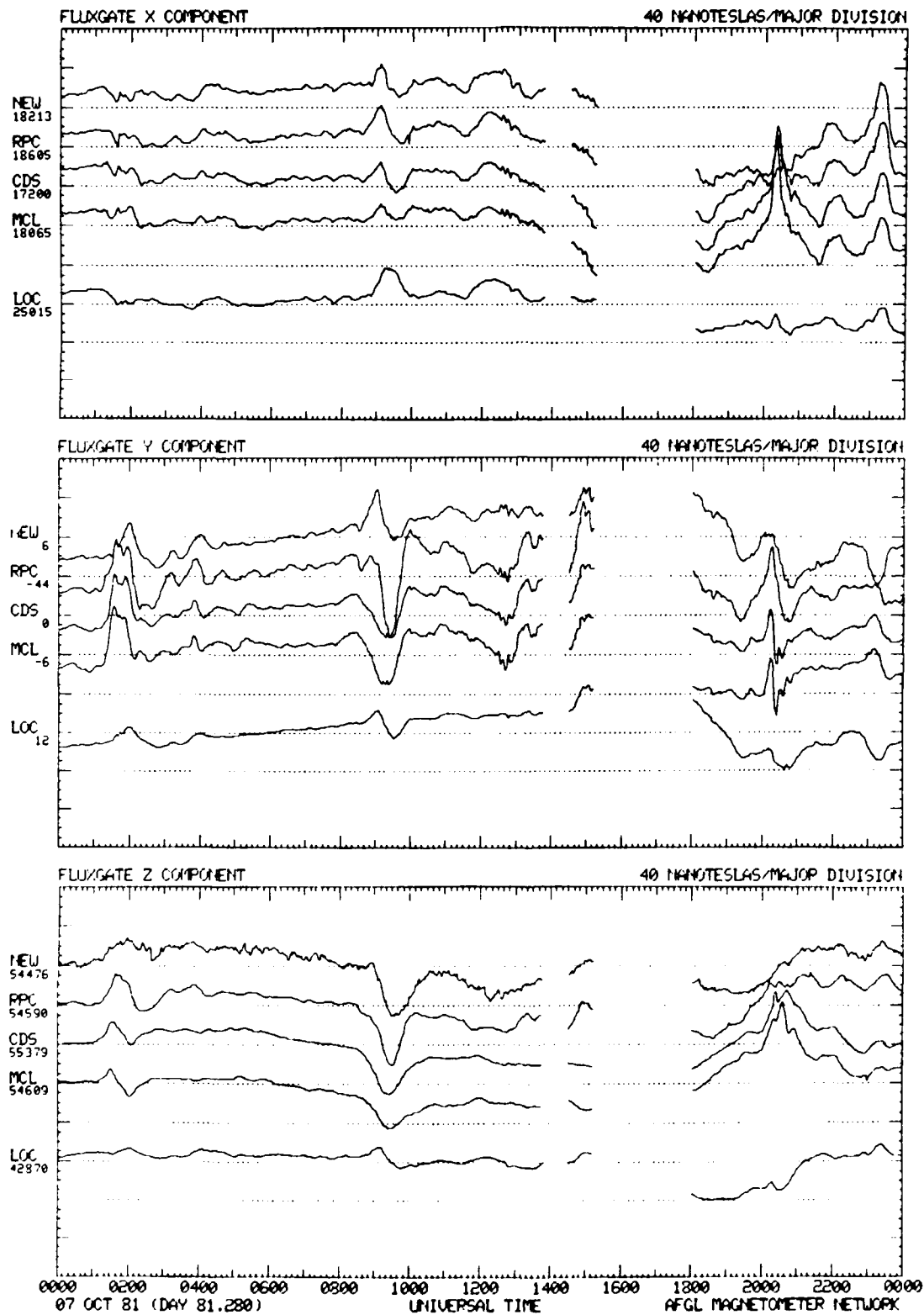
A 10x10 grid of squares. The top-left square is missing, creating a stepped shape. The grid consists of 10 rows and 10 columns. The first row has 9 squares (columns 2-10). The second row has 10 squares (columns 1-10). The third row has 10 squares (columns 1-10). The fourth row has 10 squares (columns 1-10). The fifth row has 10 squares (columns 1-10). The sixth row has 10 squares (columns 1-10). The seventh row has 10 squares (columns 1-10). The eighth row has 10 squares (columns 1-10). The ninth row has 10 squares (columns 1-10). The tenth row has 10 squares (columns 1-10).



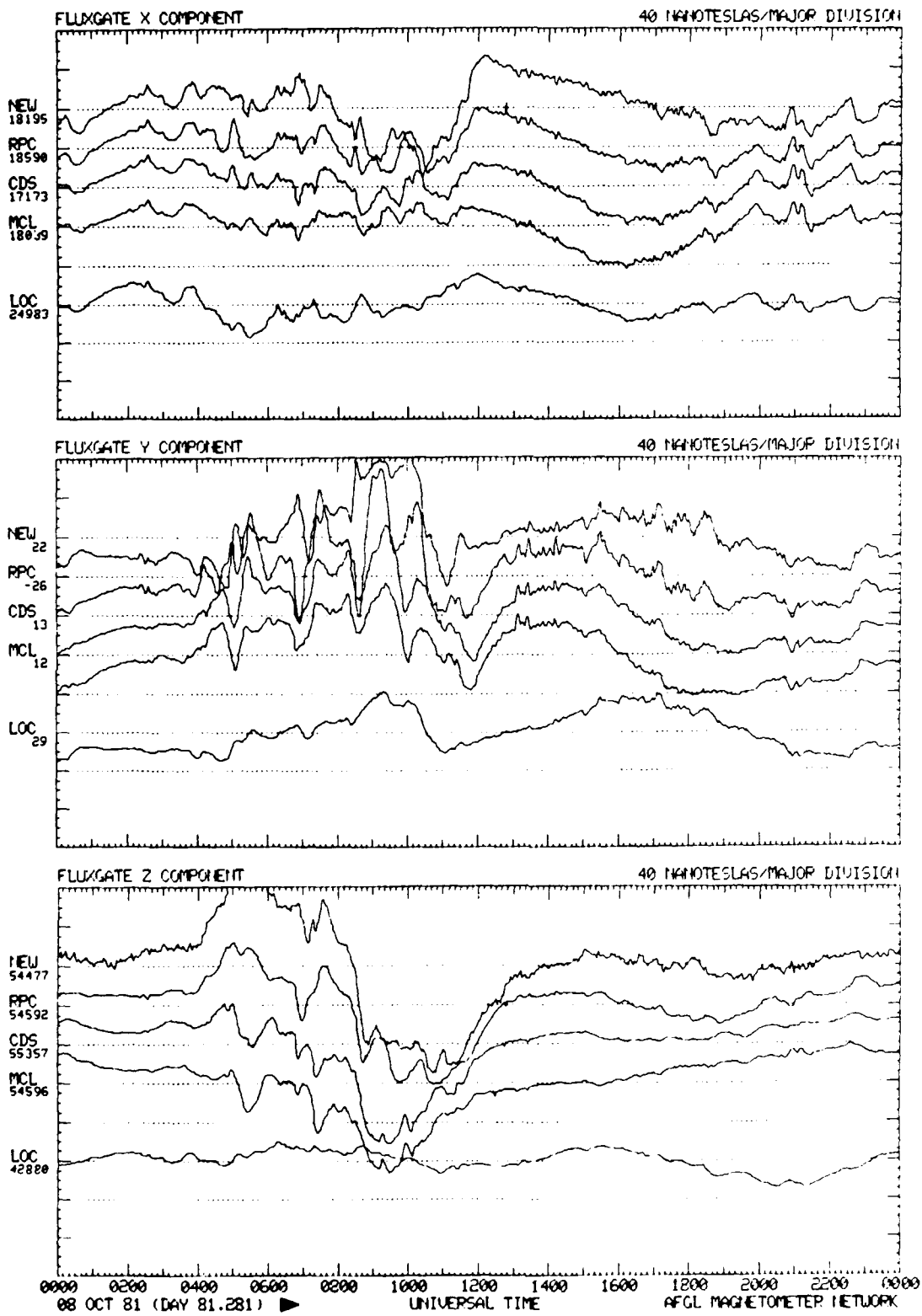


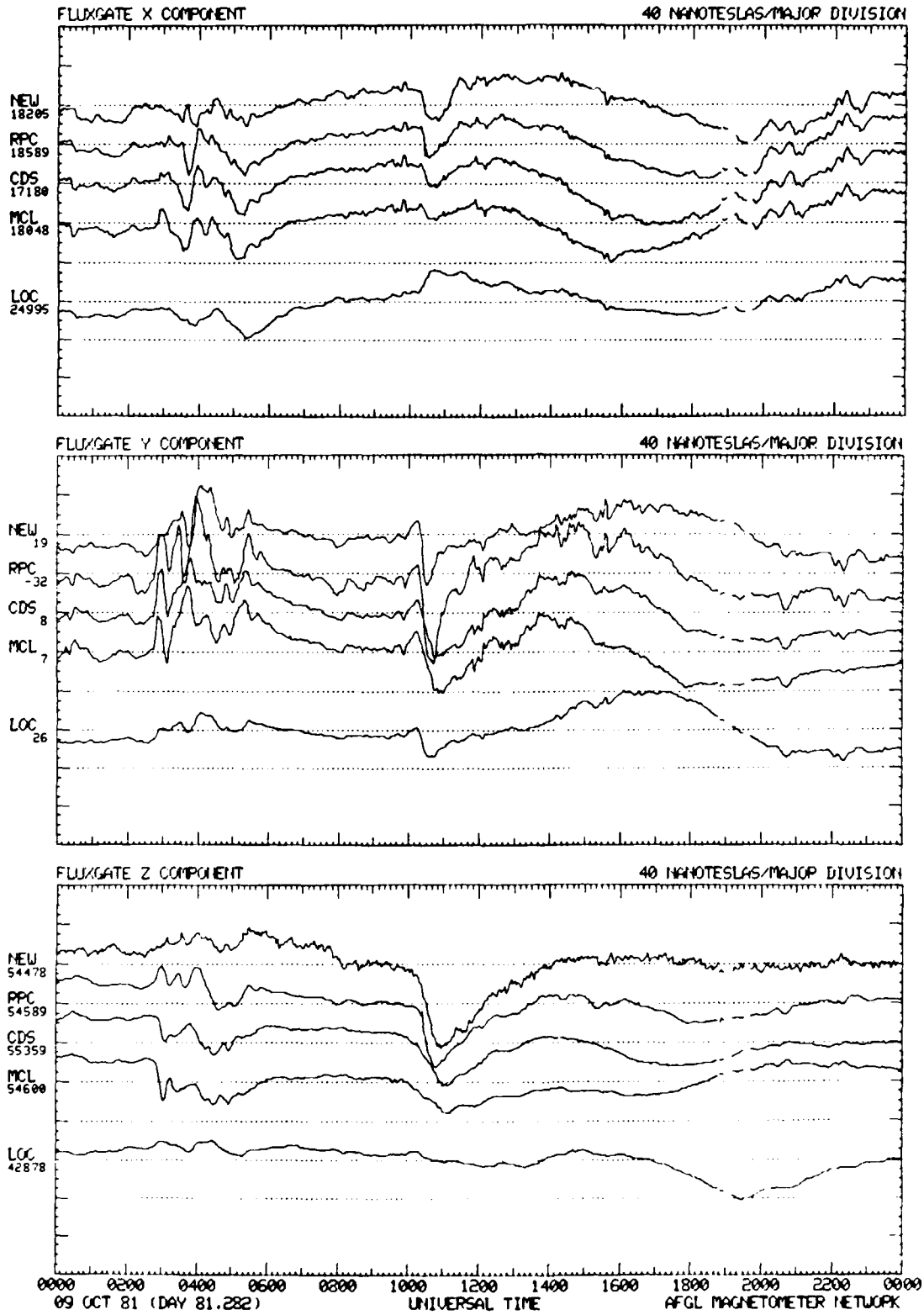


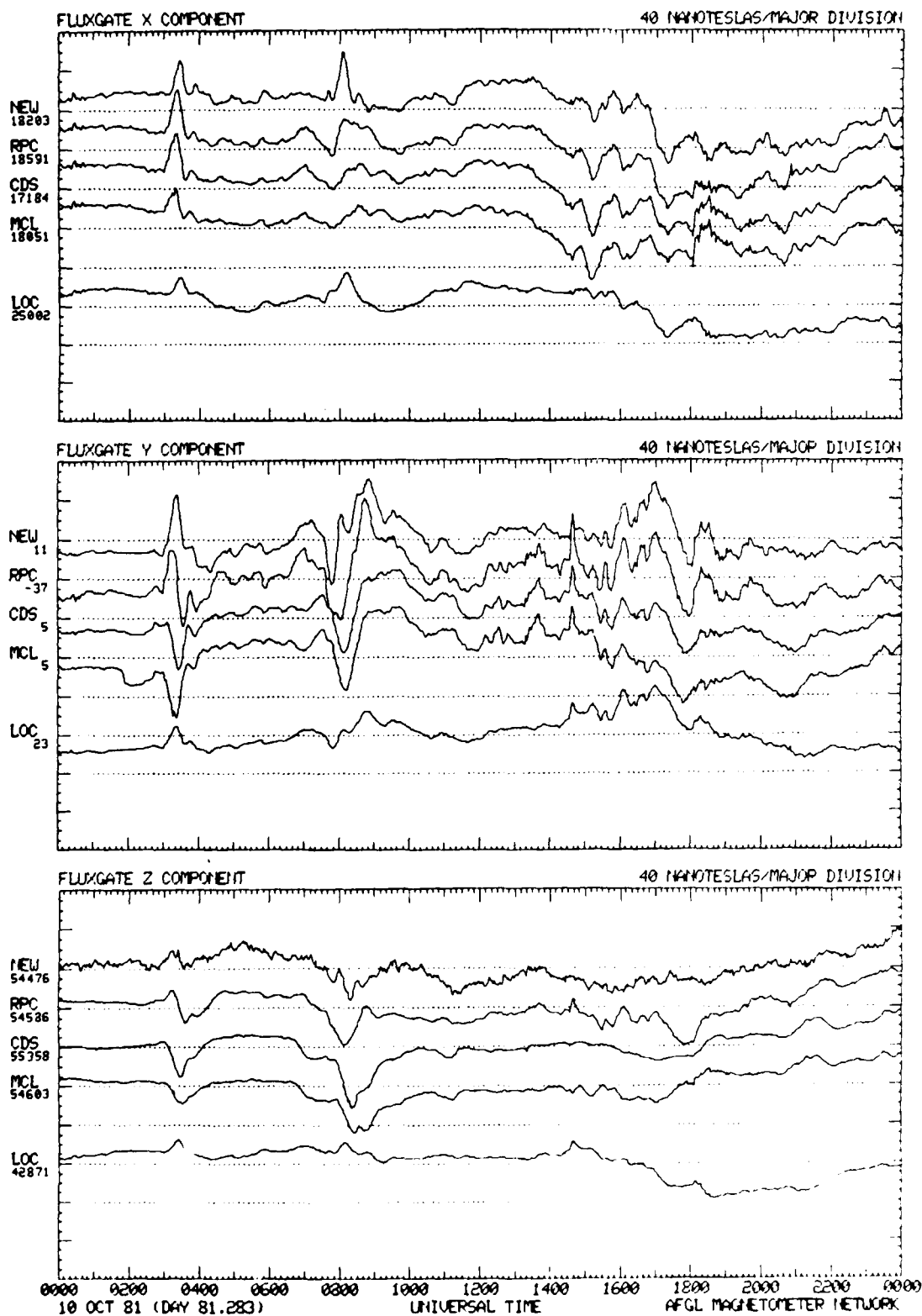


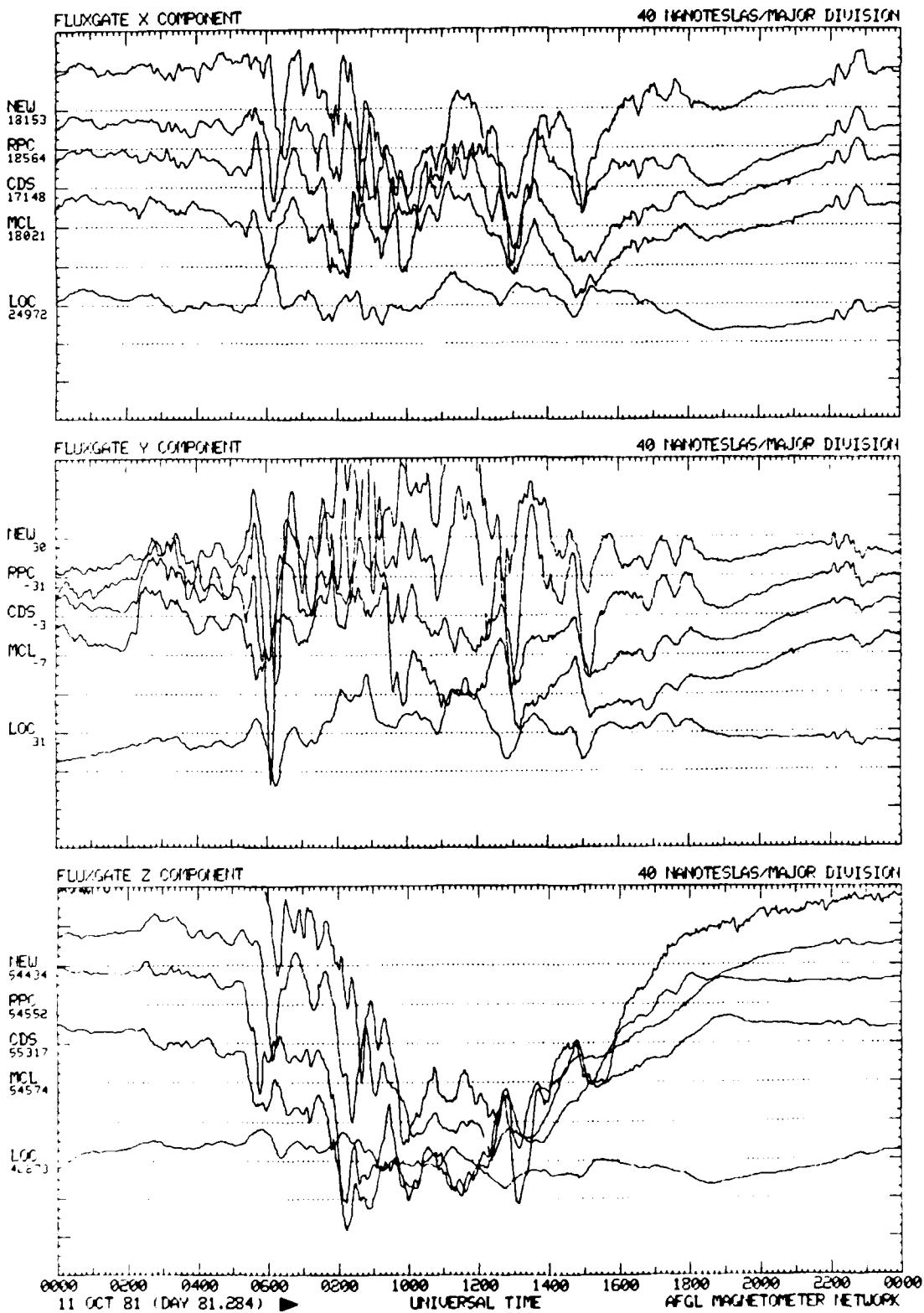


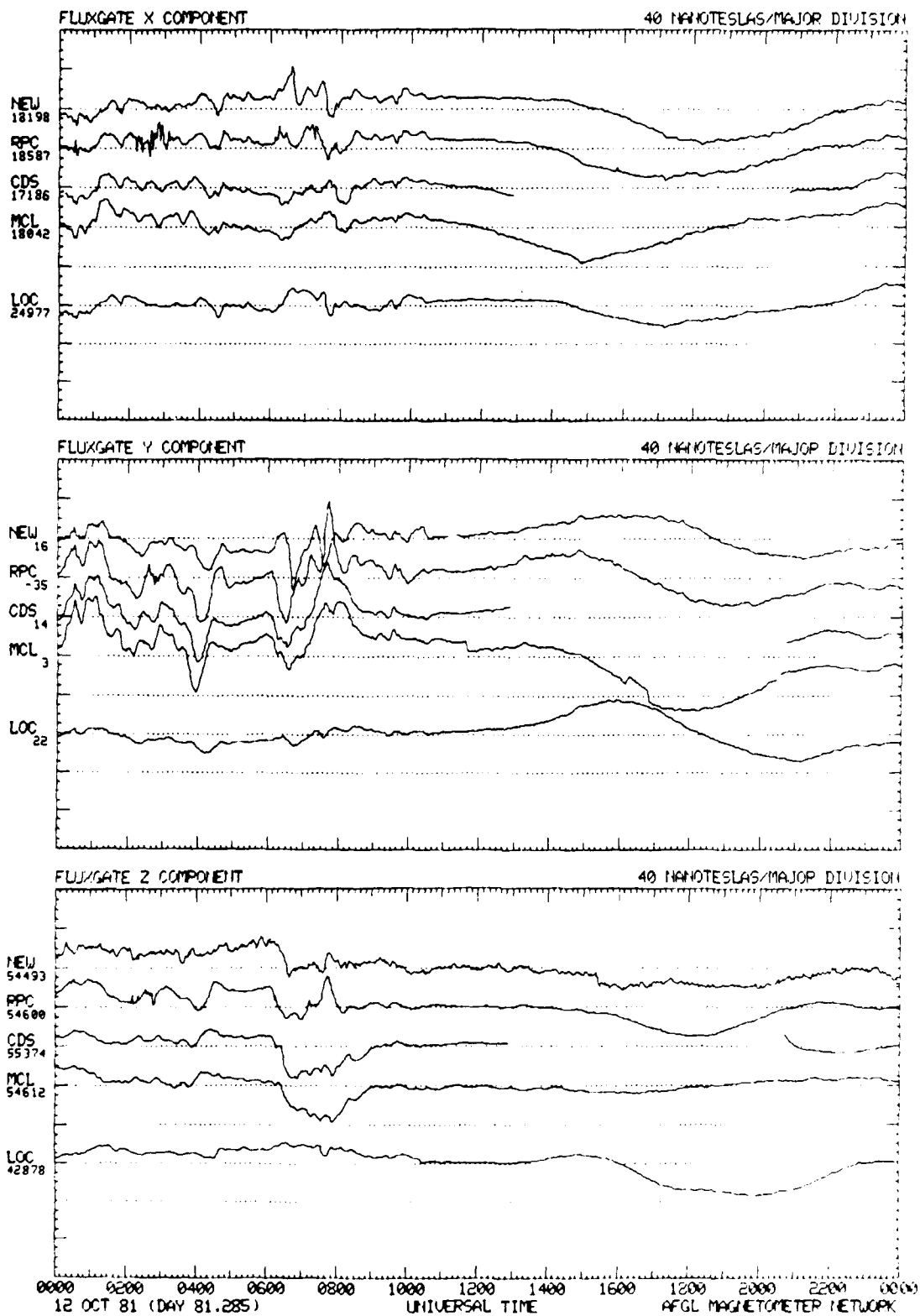


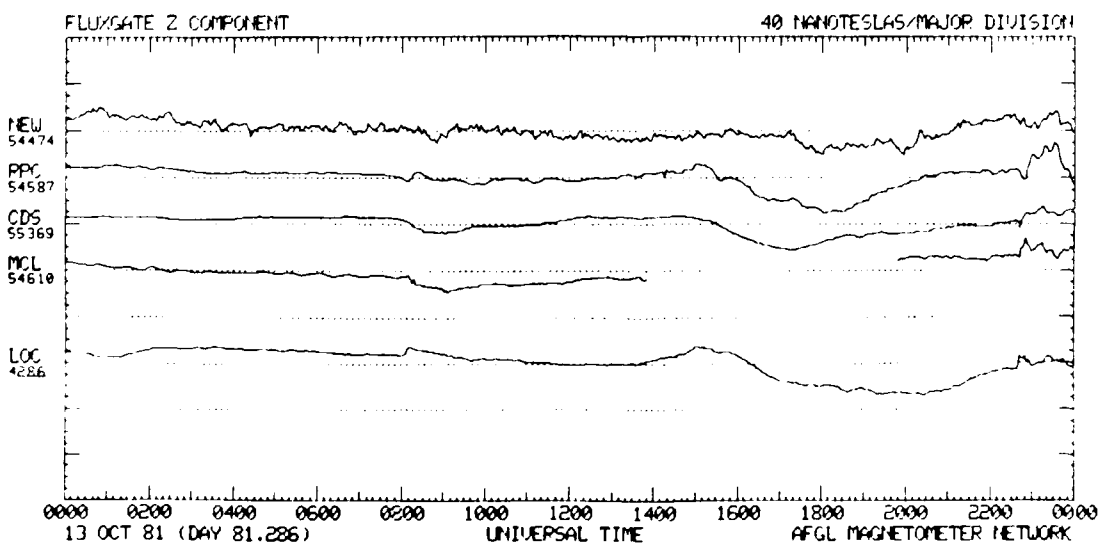
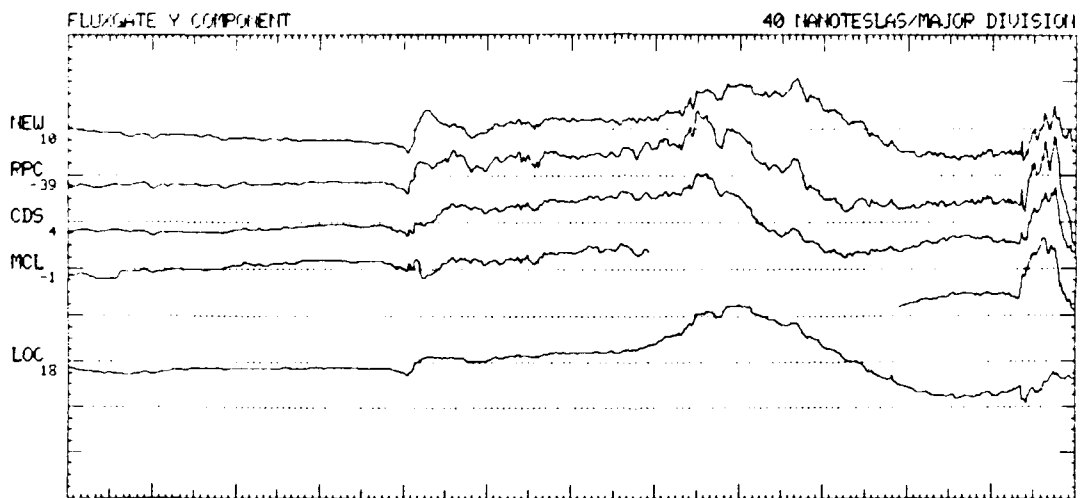
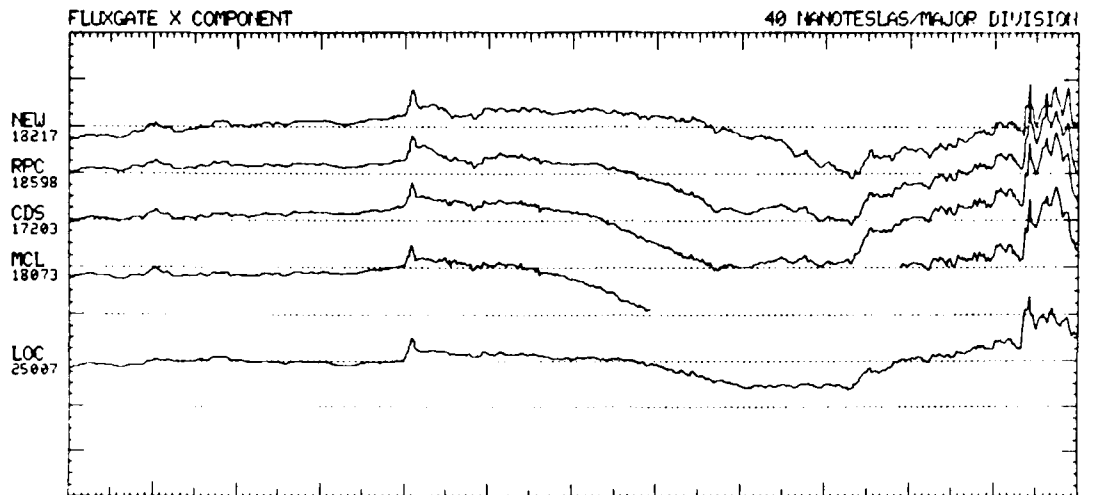


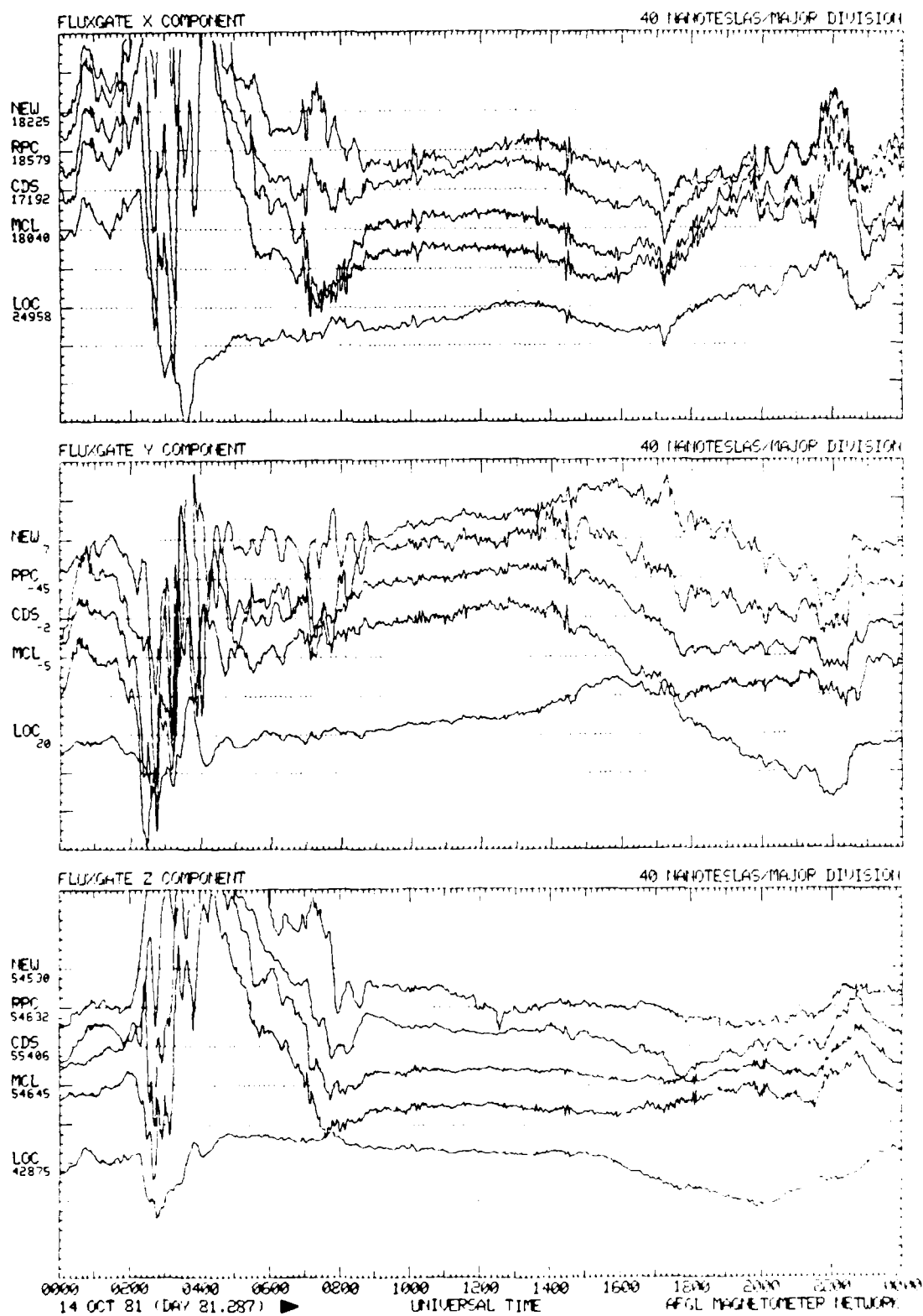


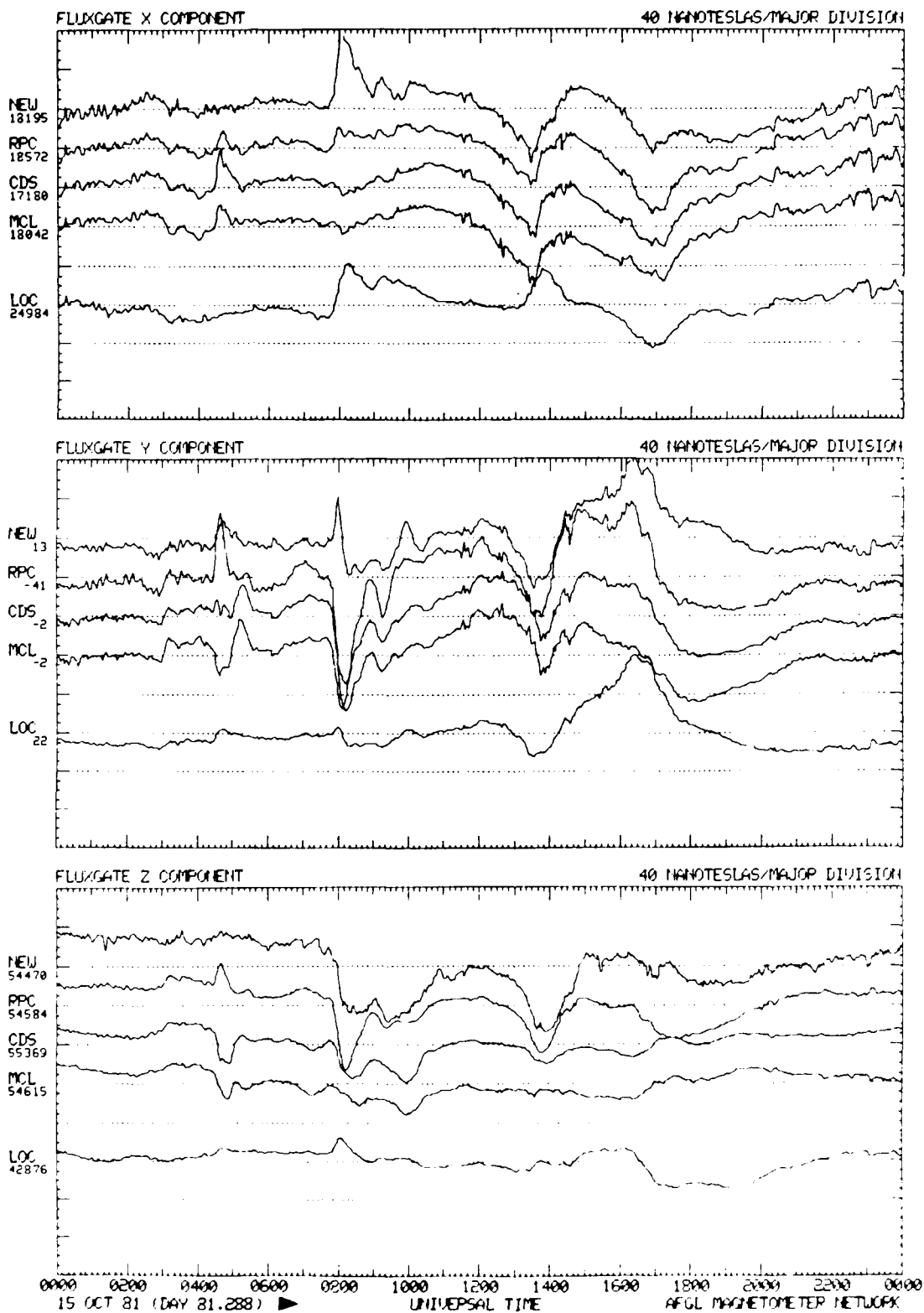




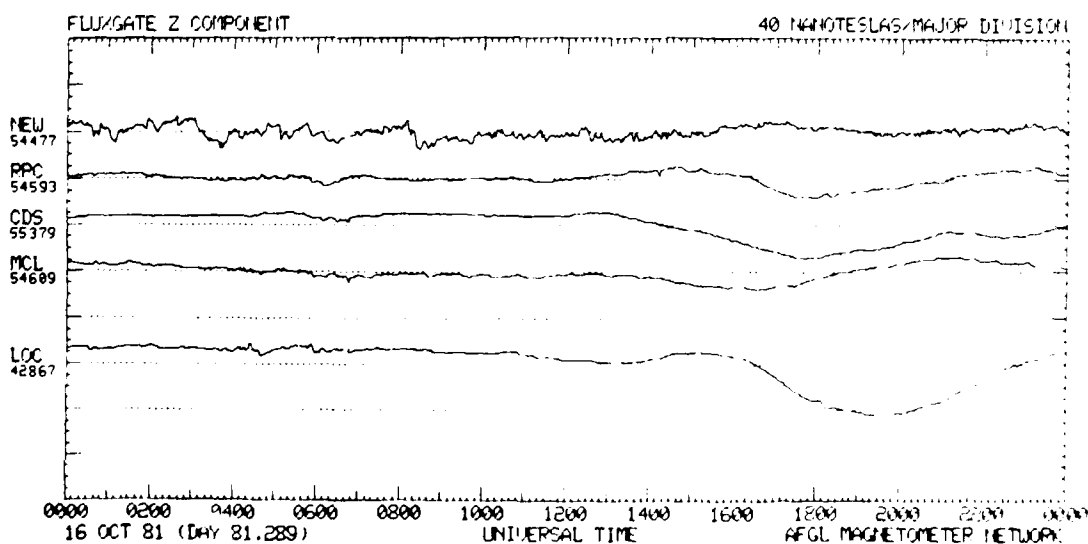
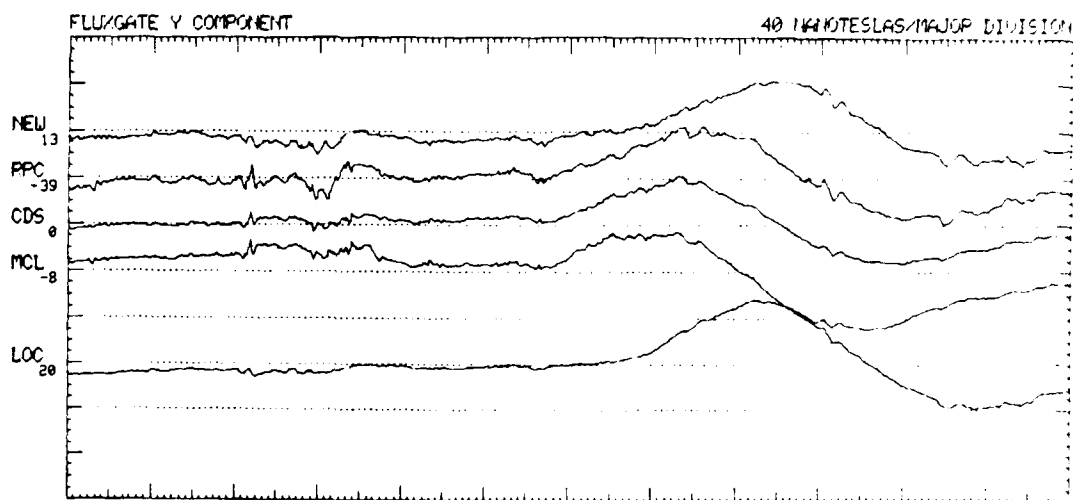
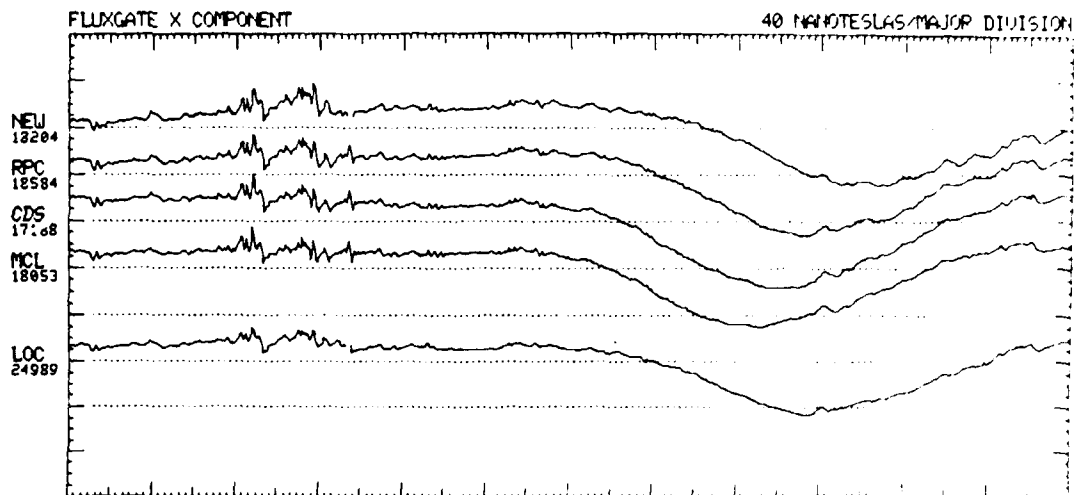


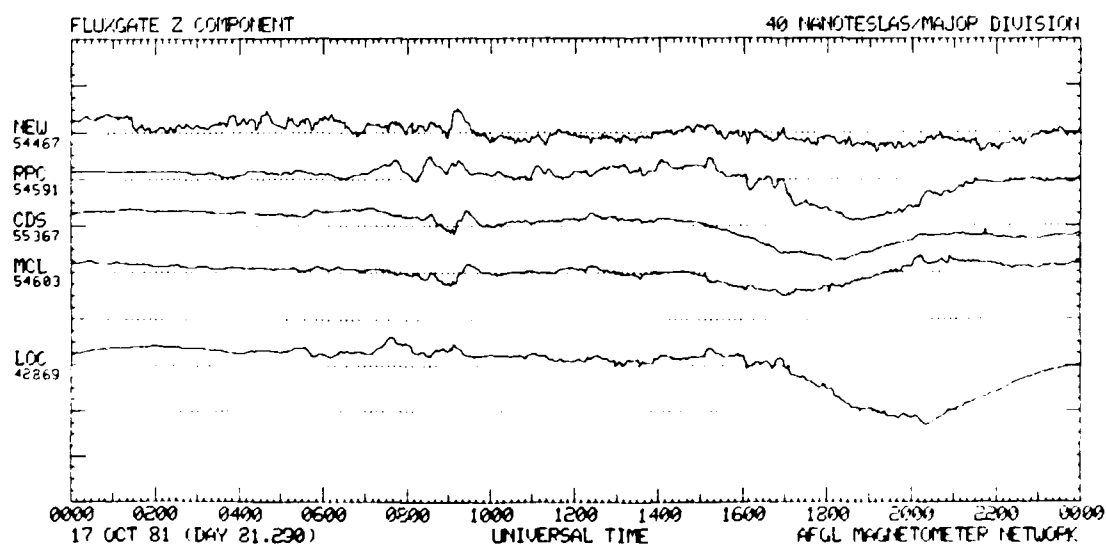
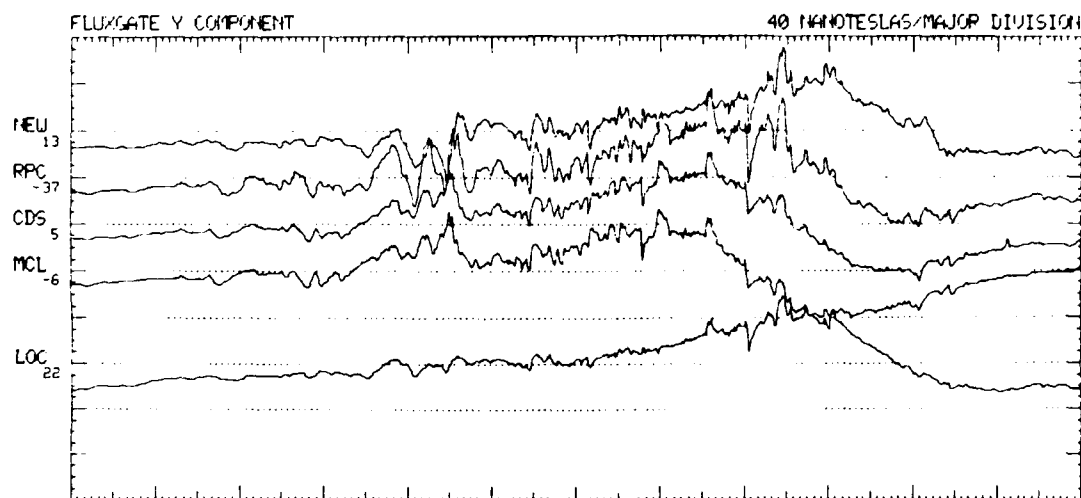
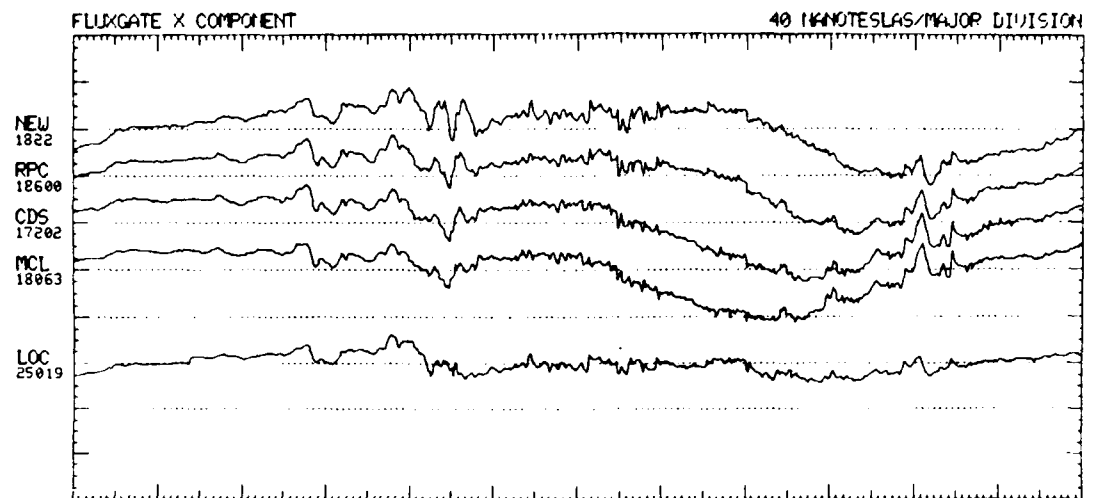


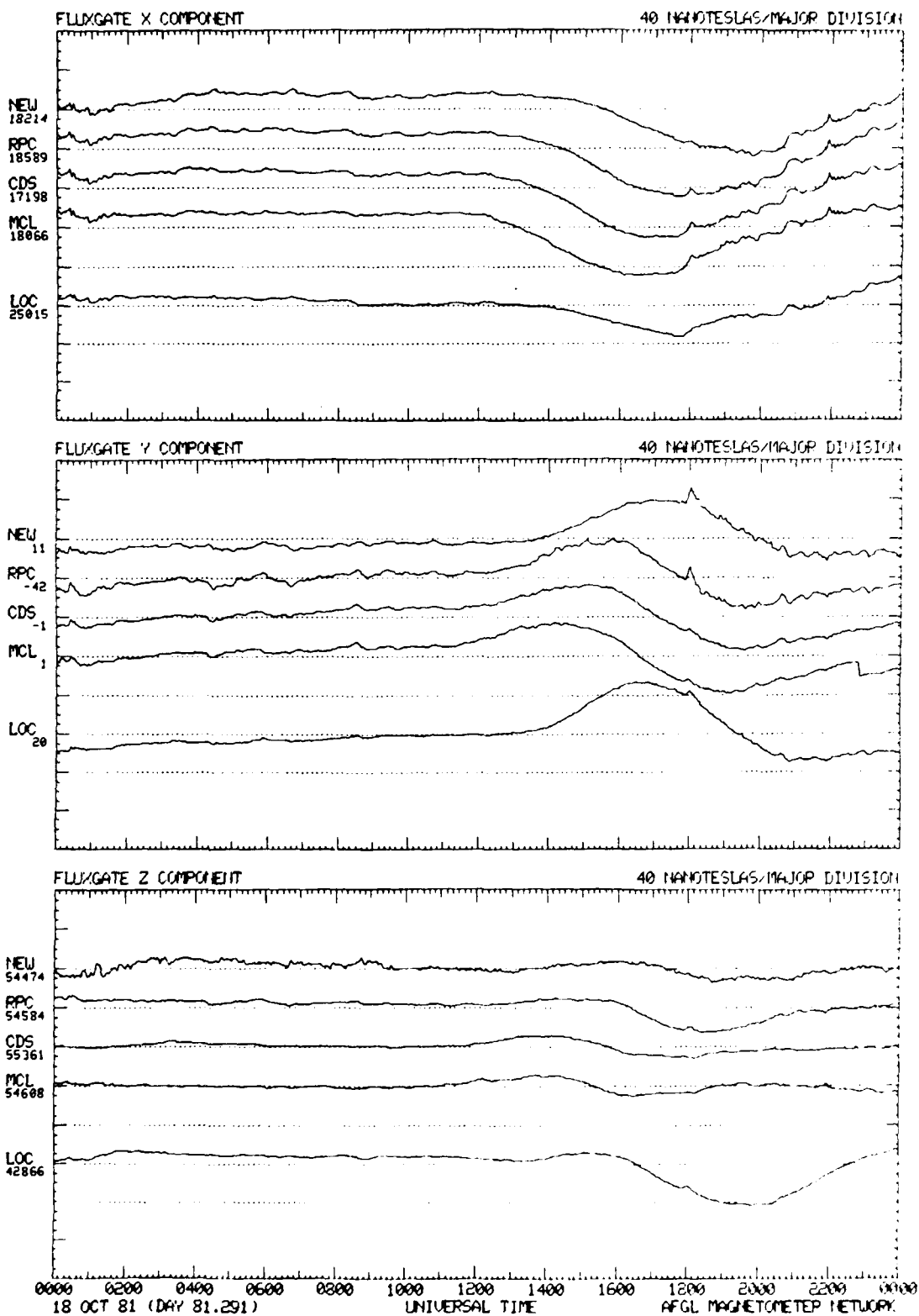


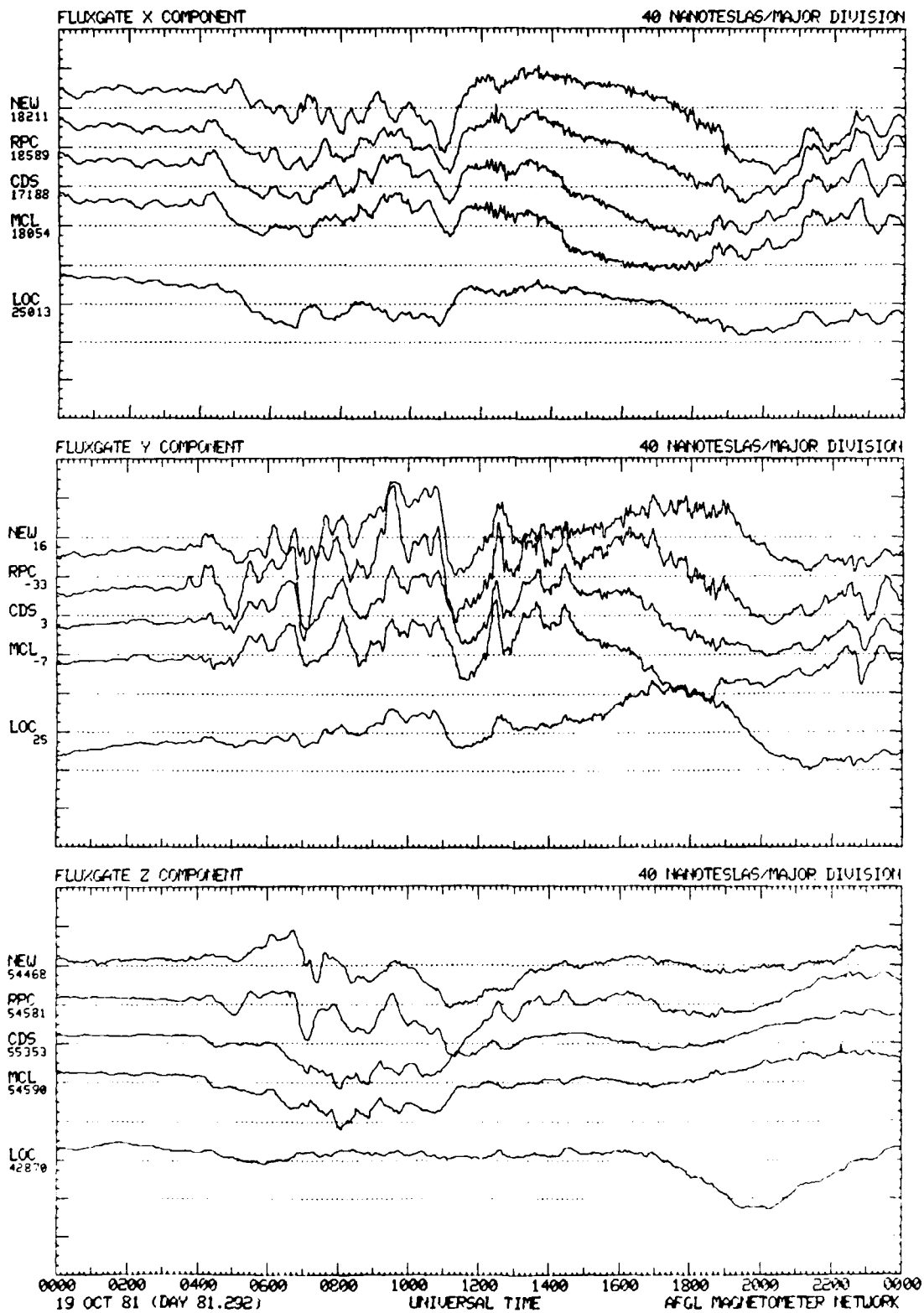


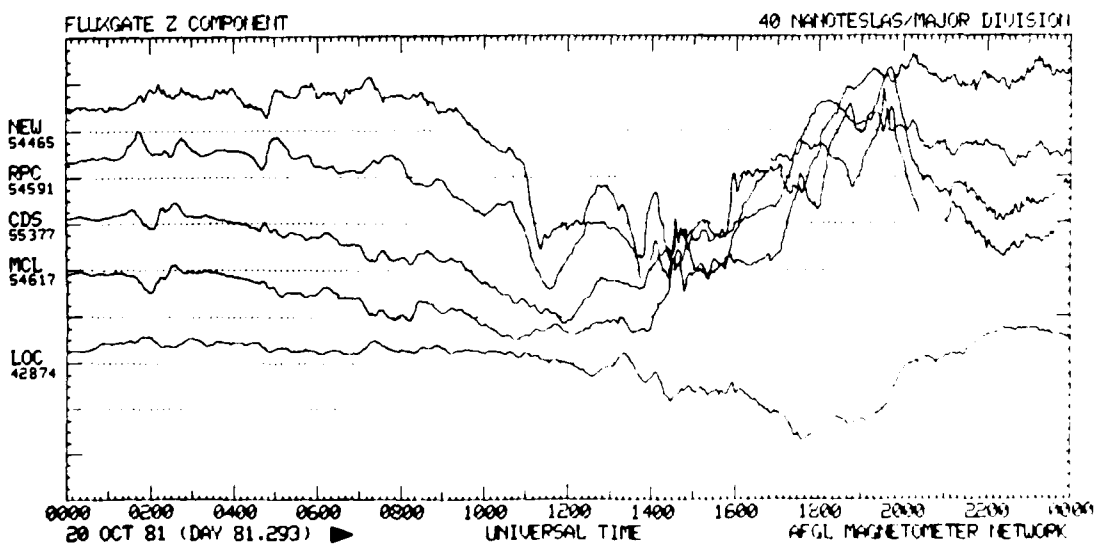
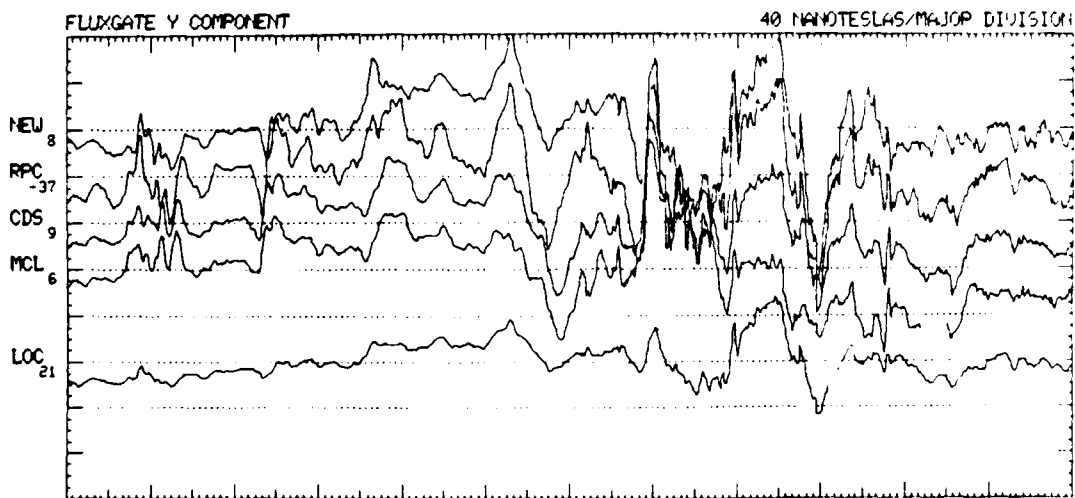
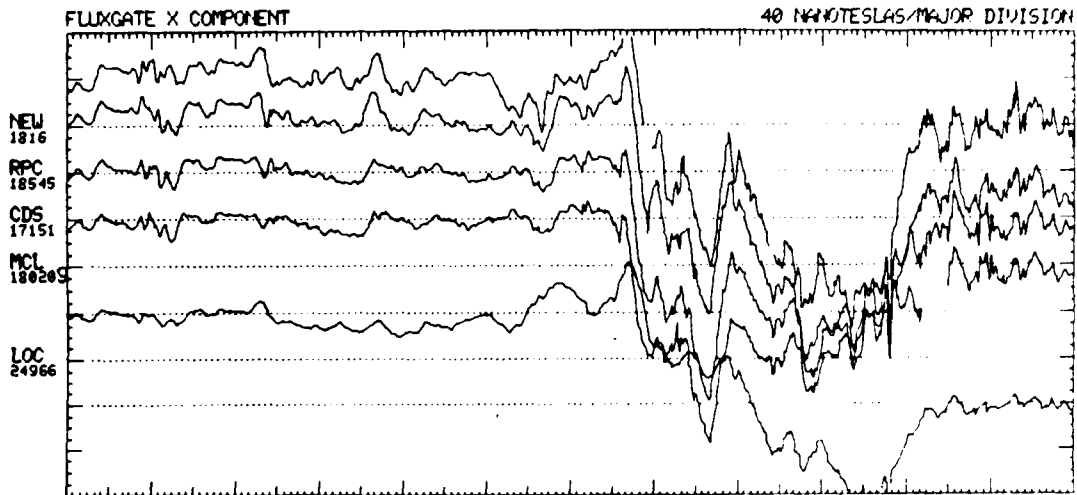


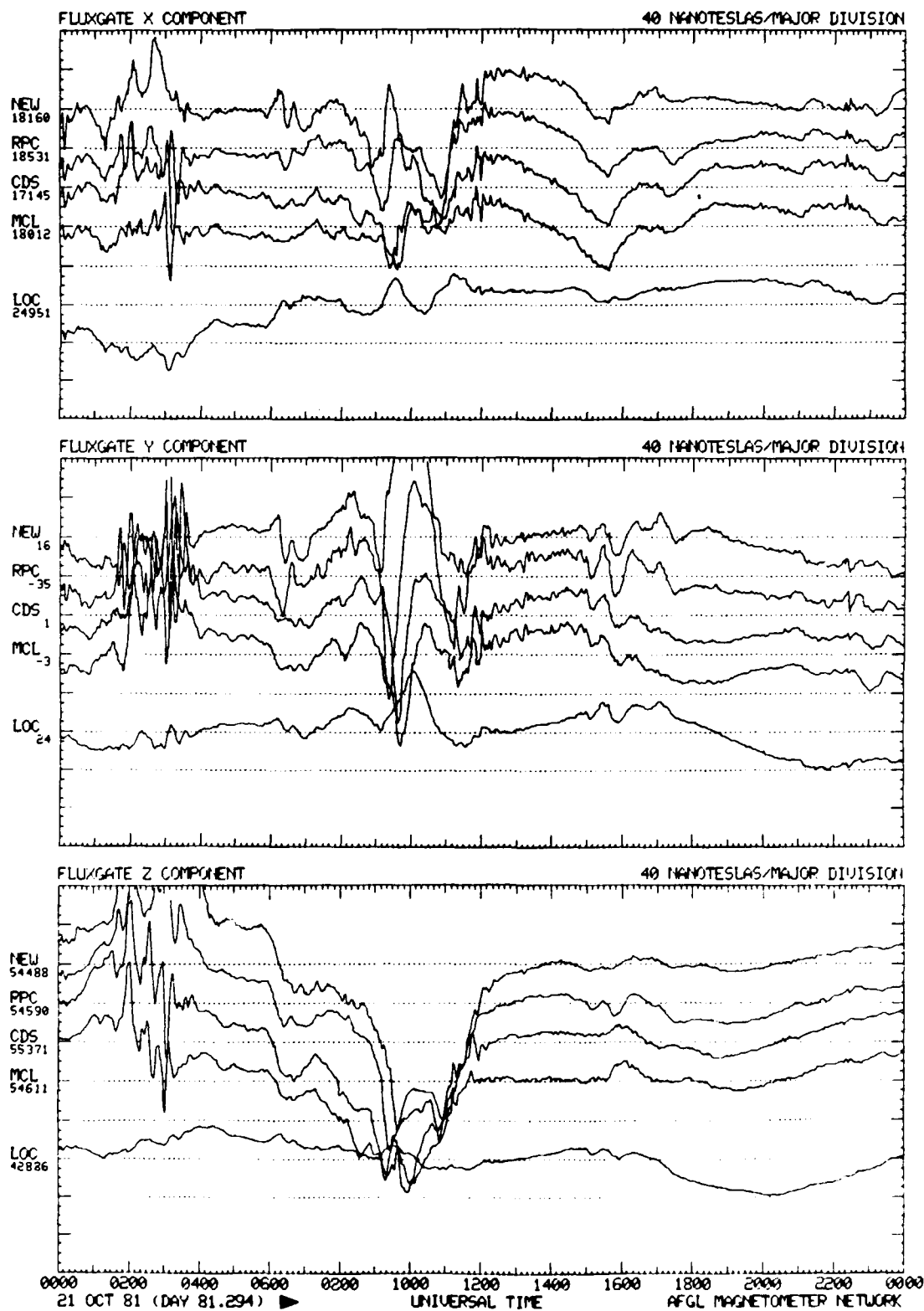


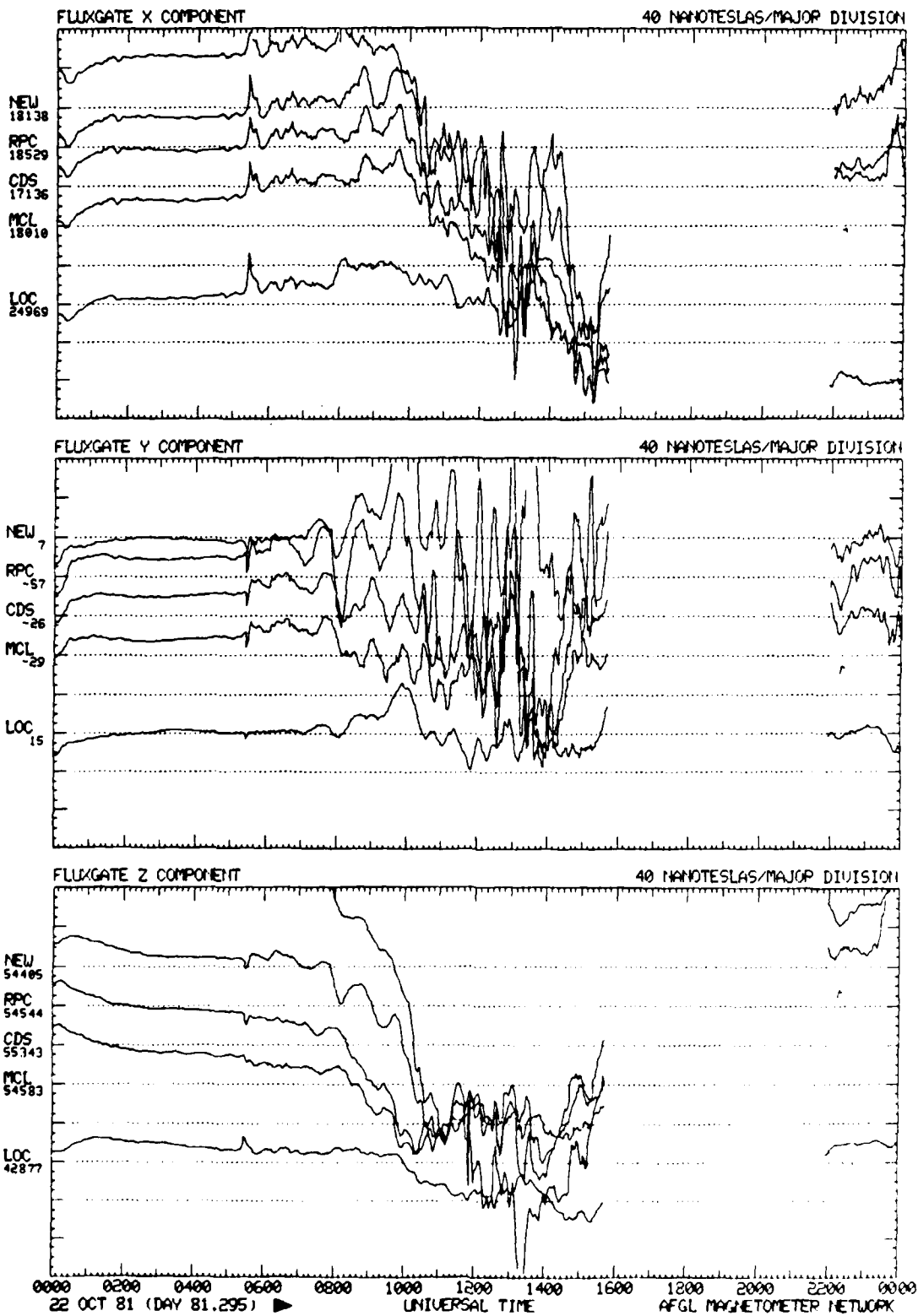


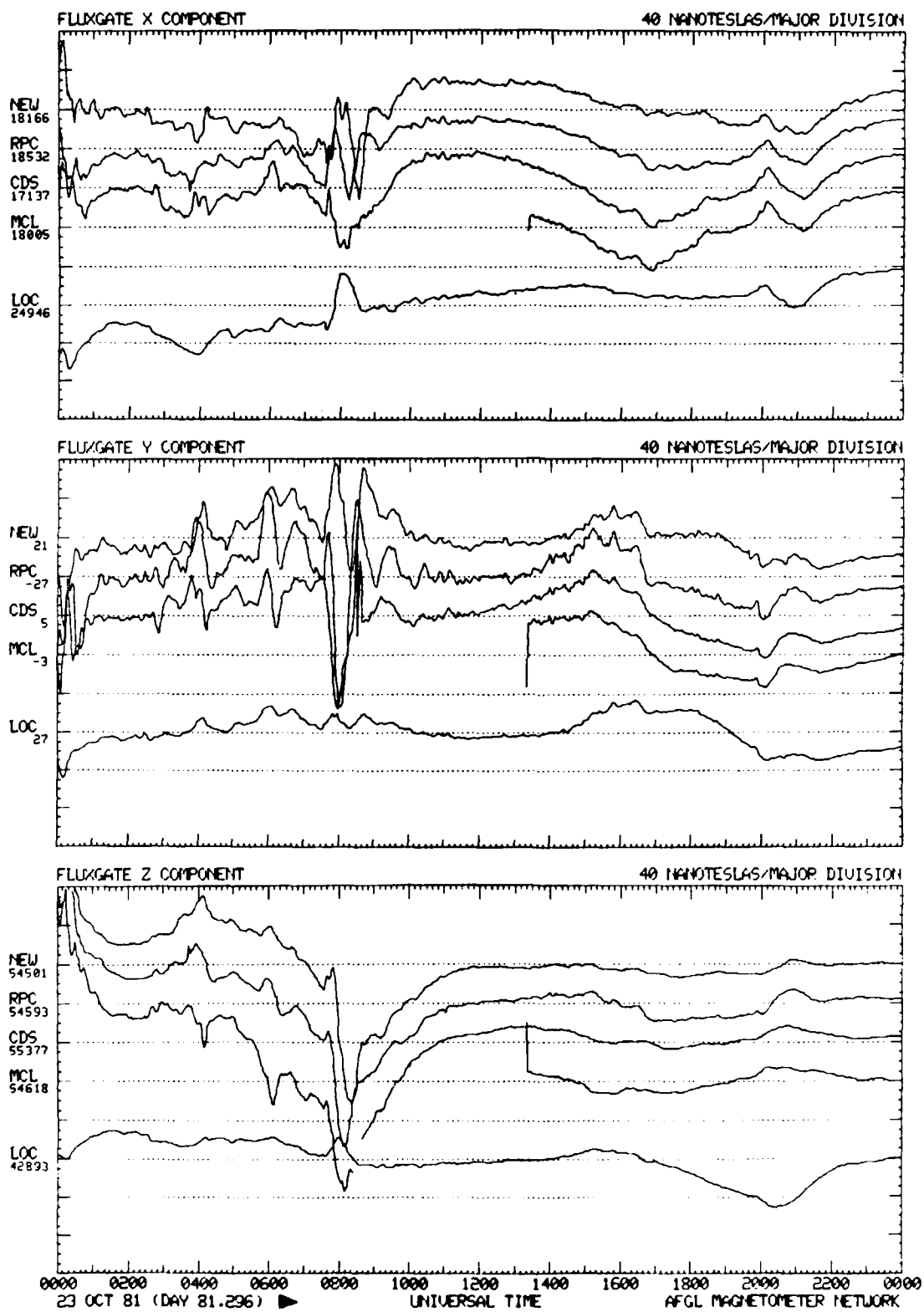




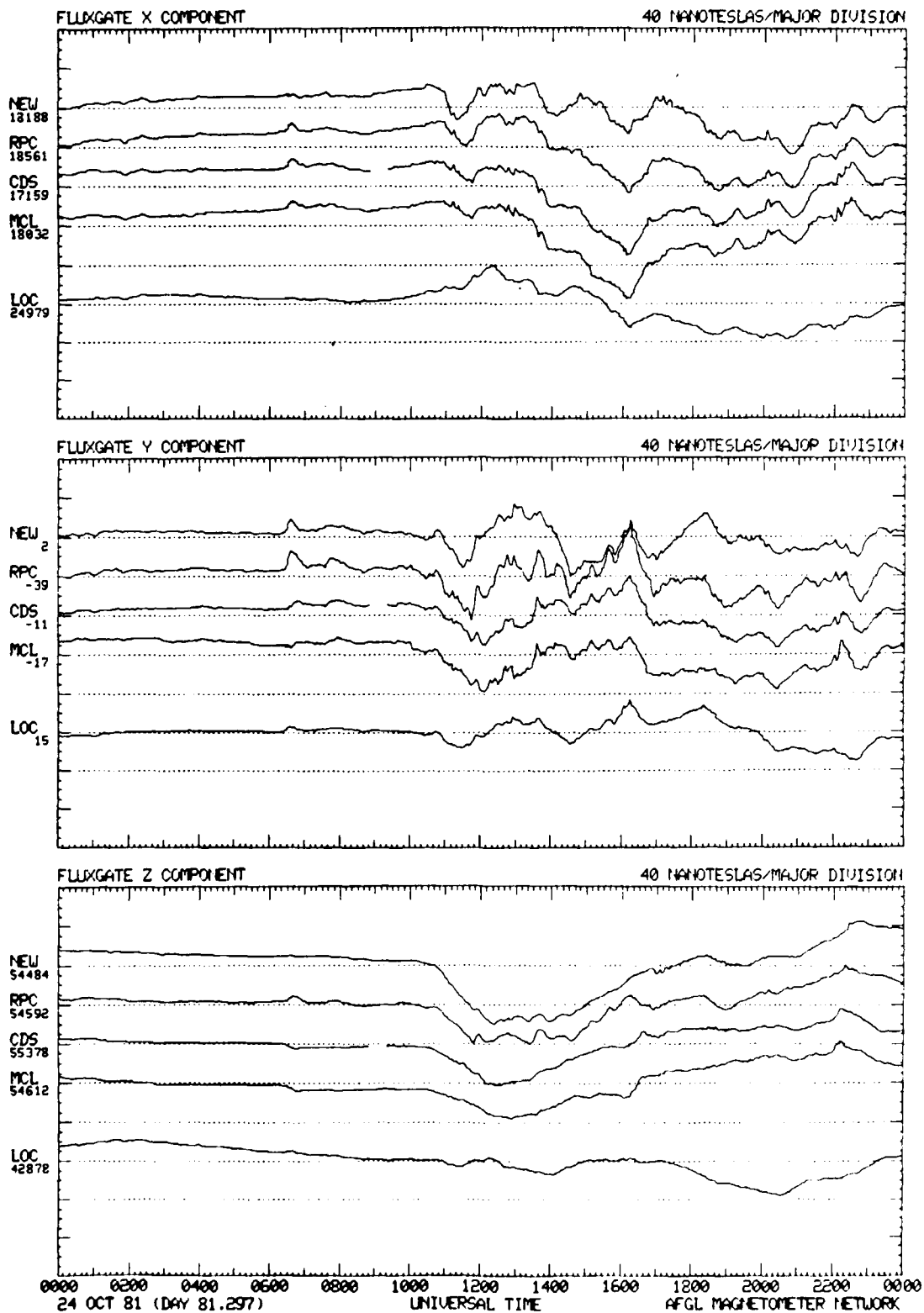


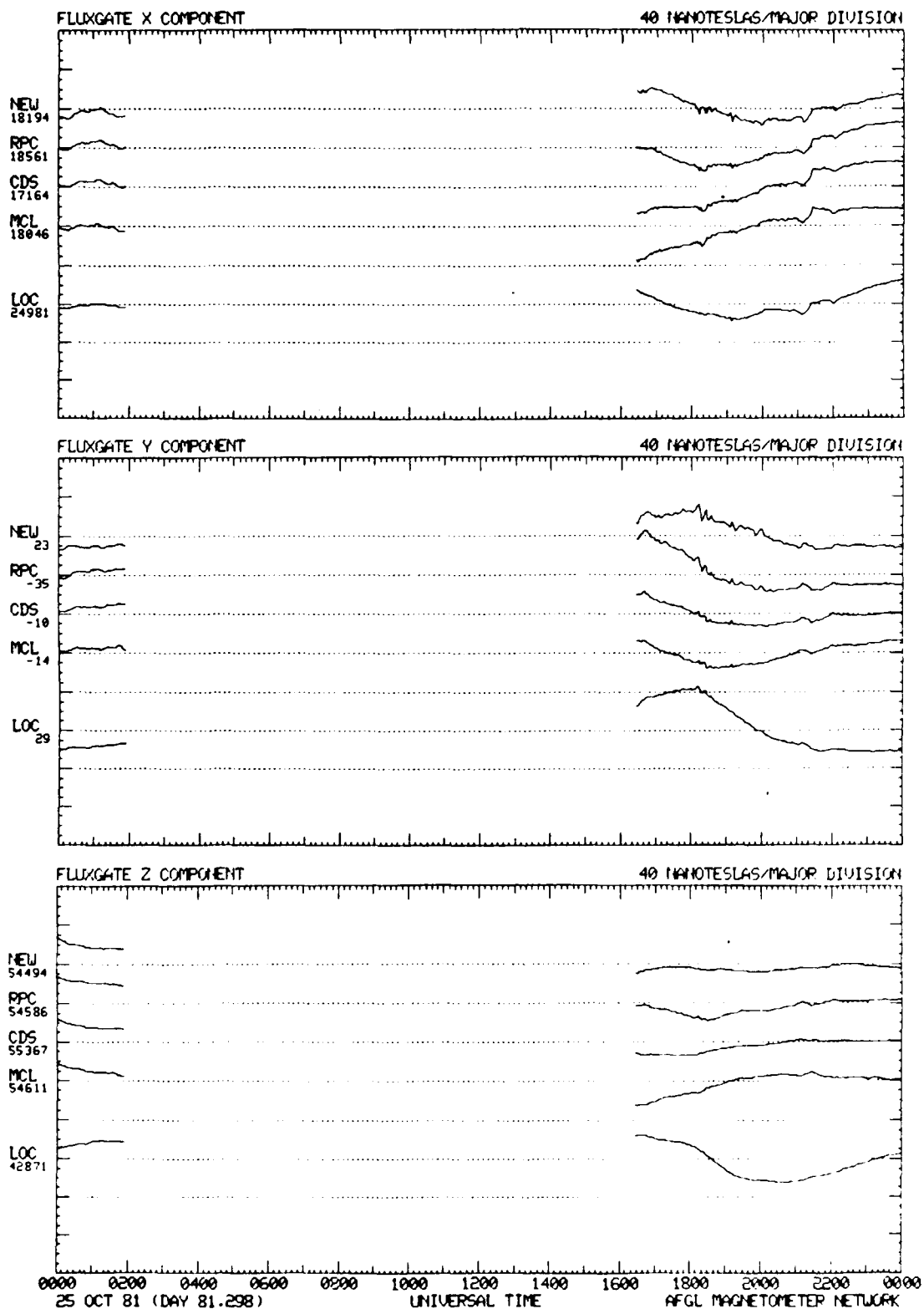


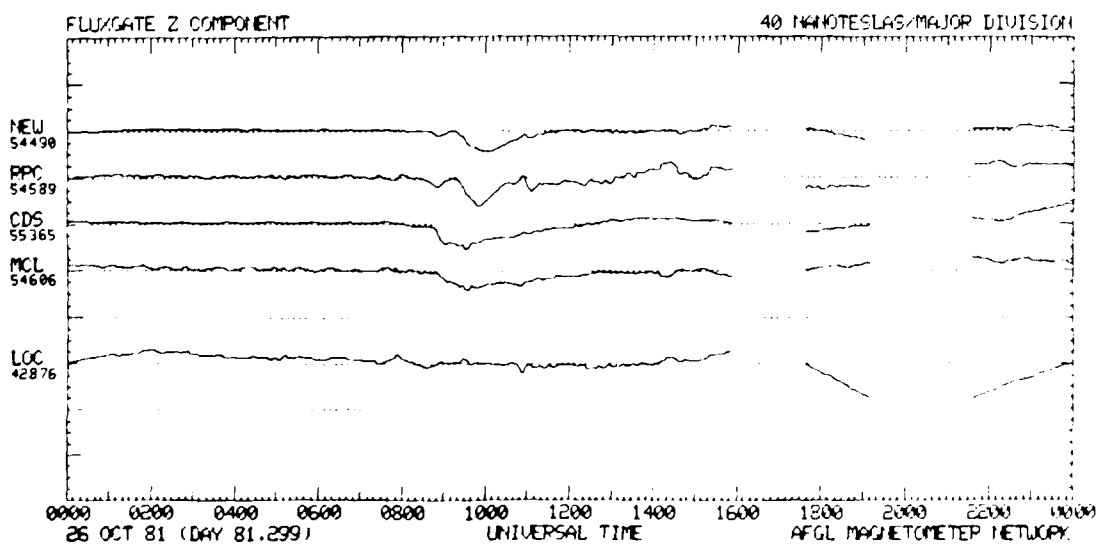
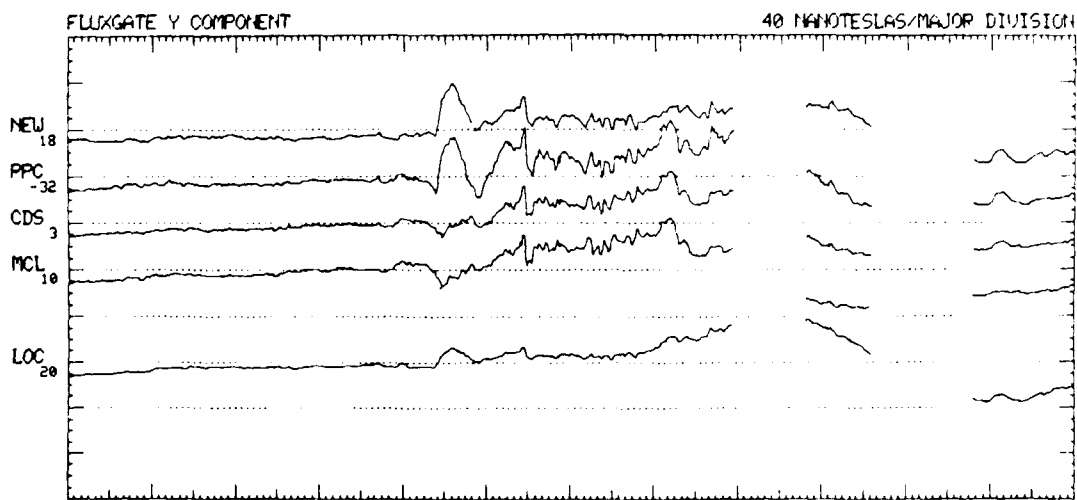
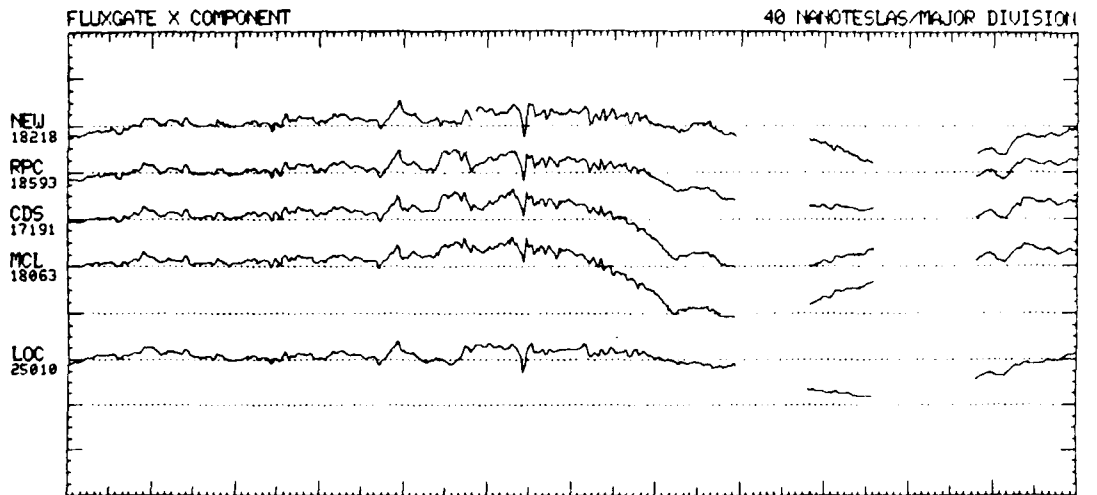


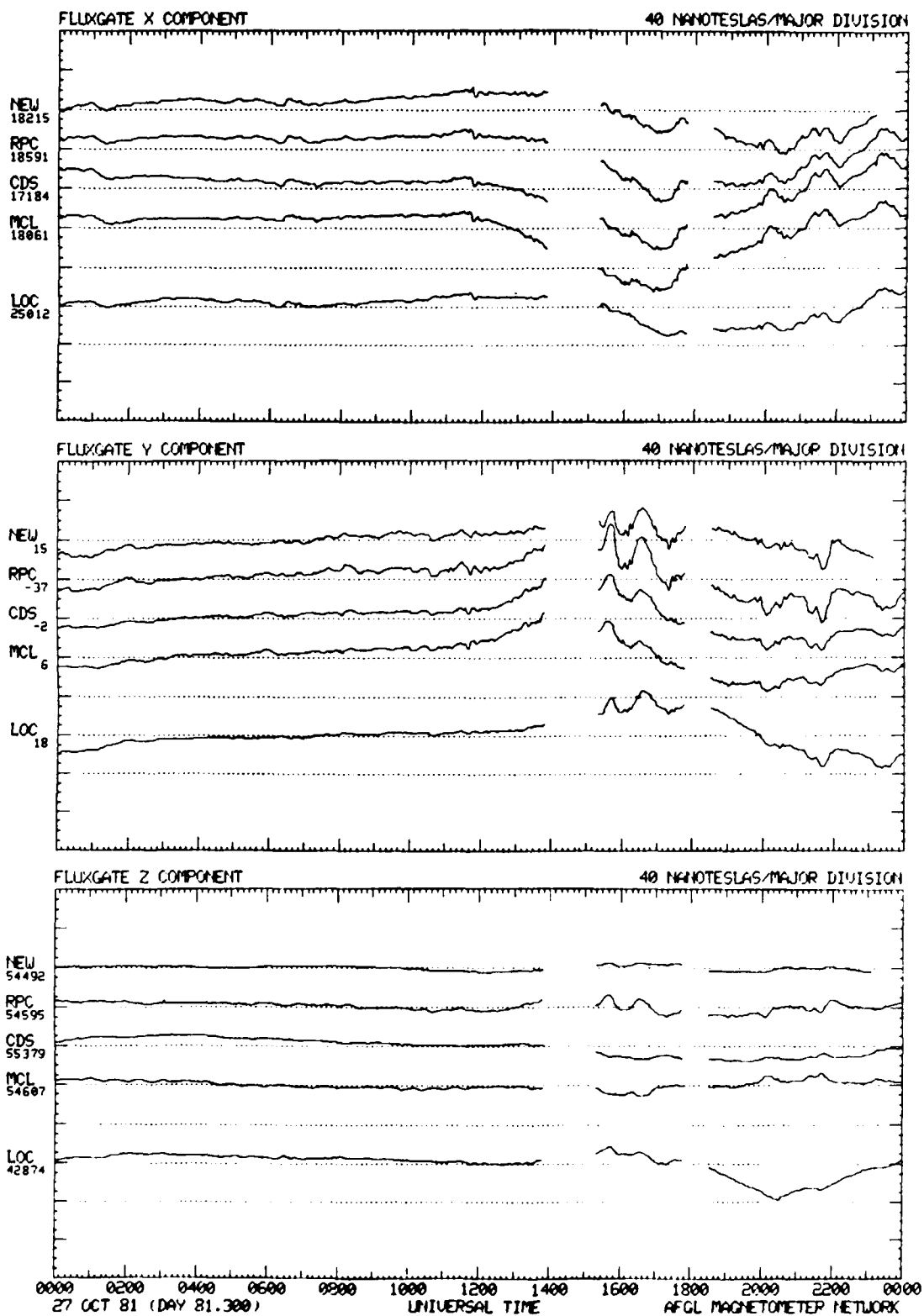


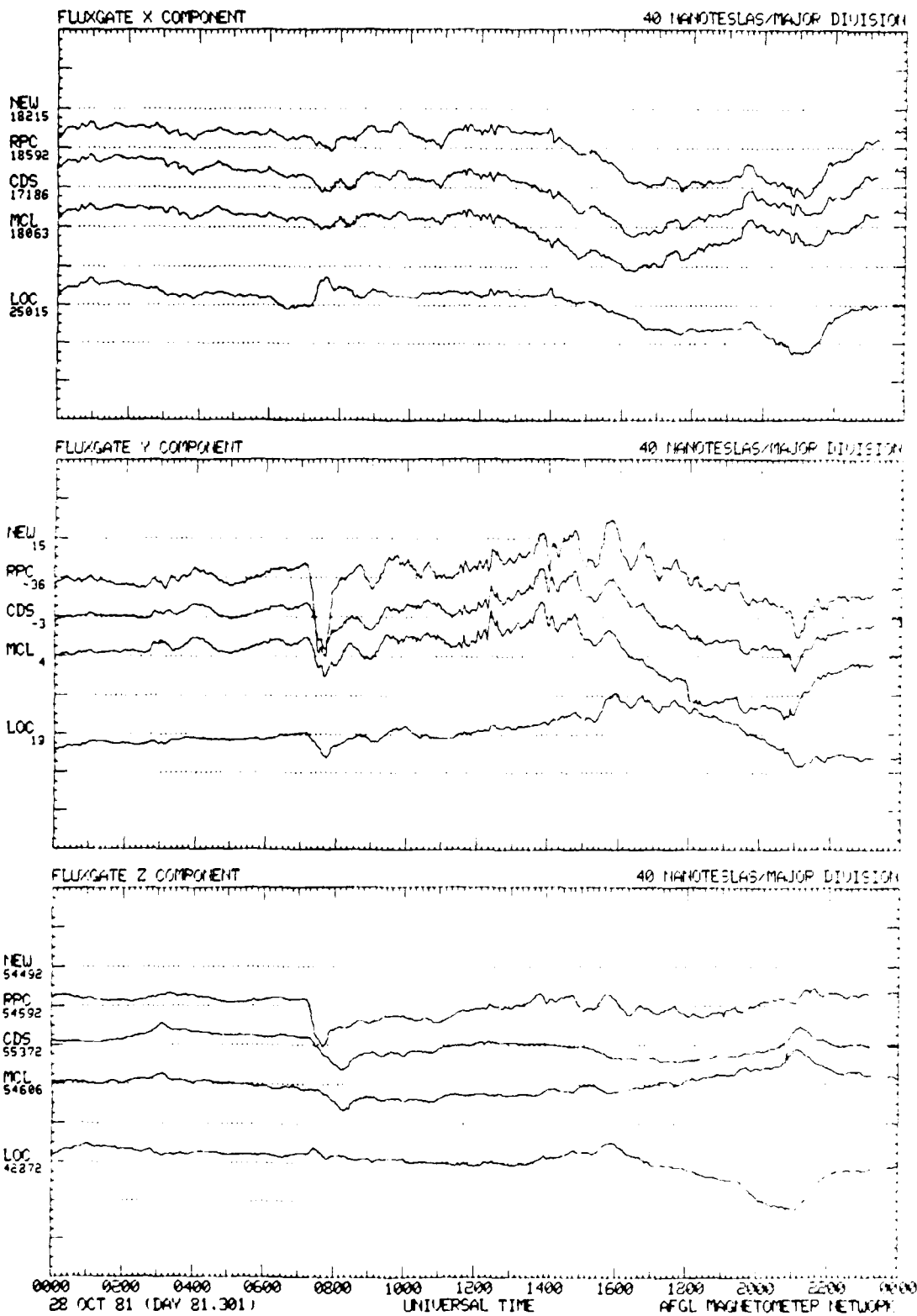


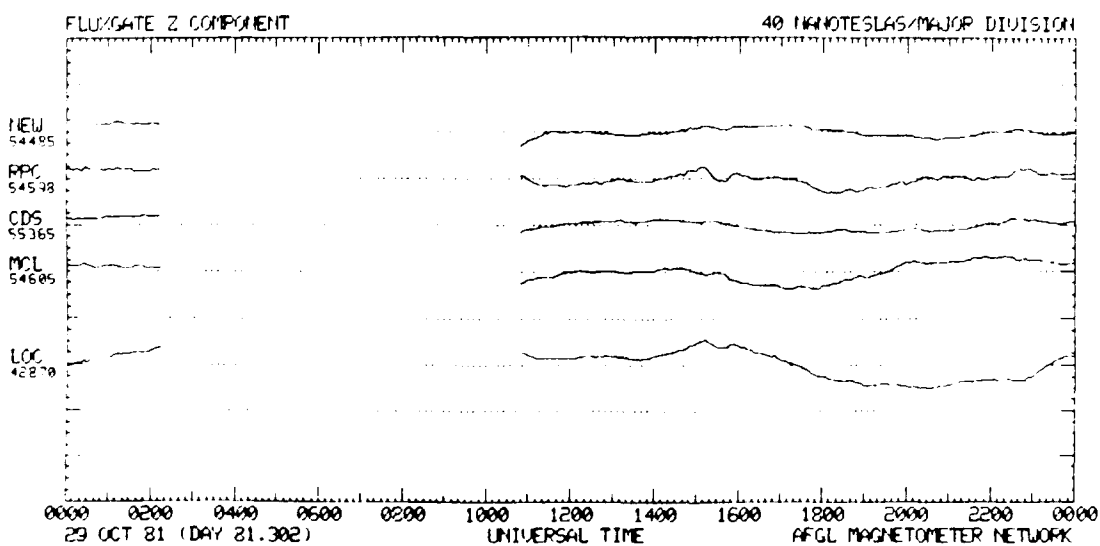
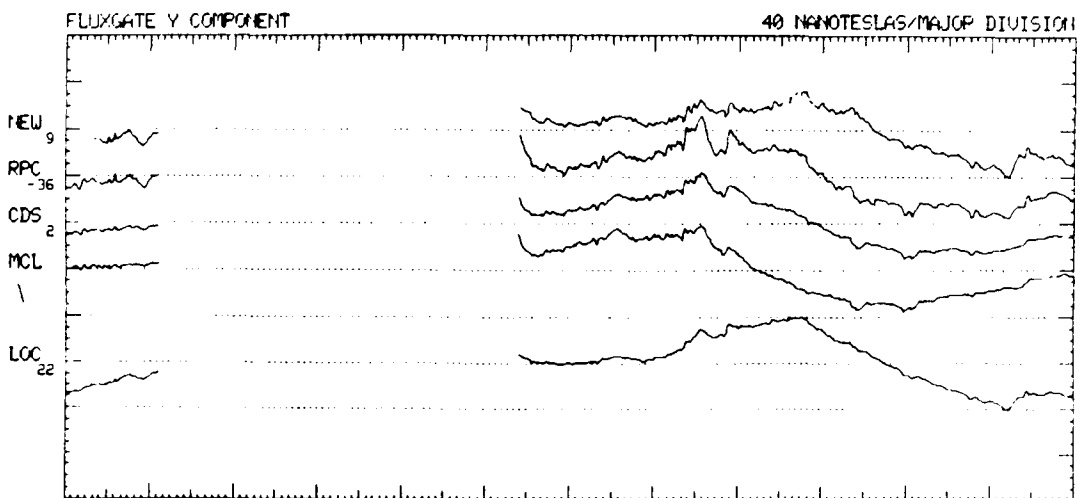
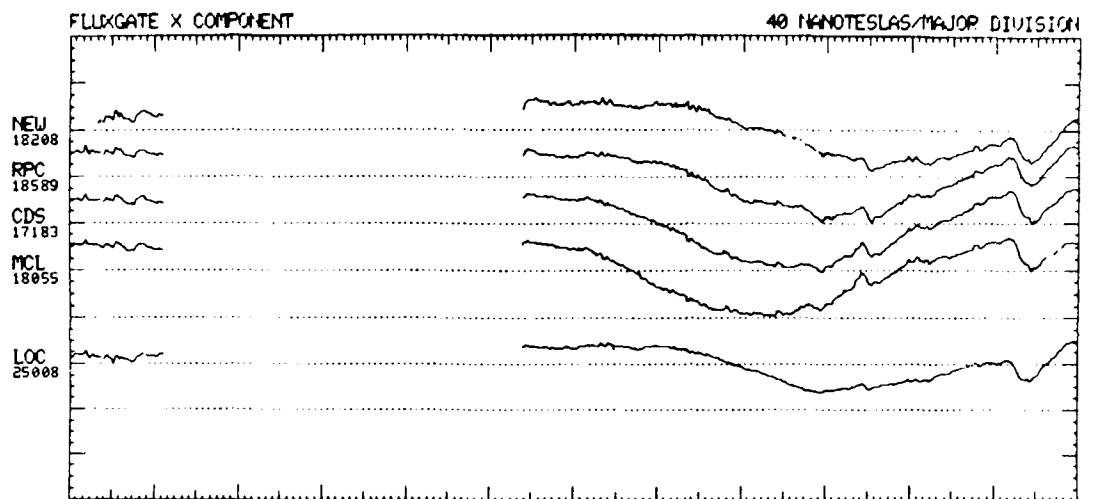


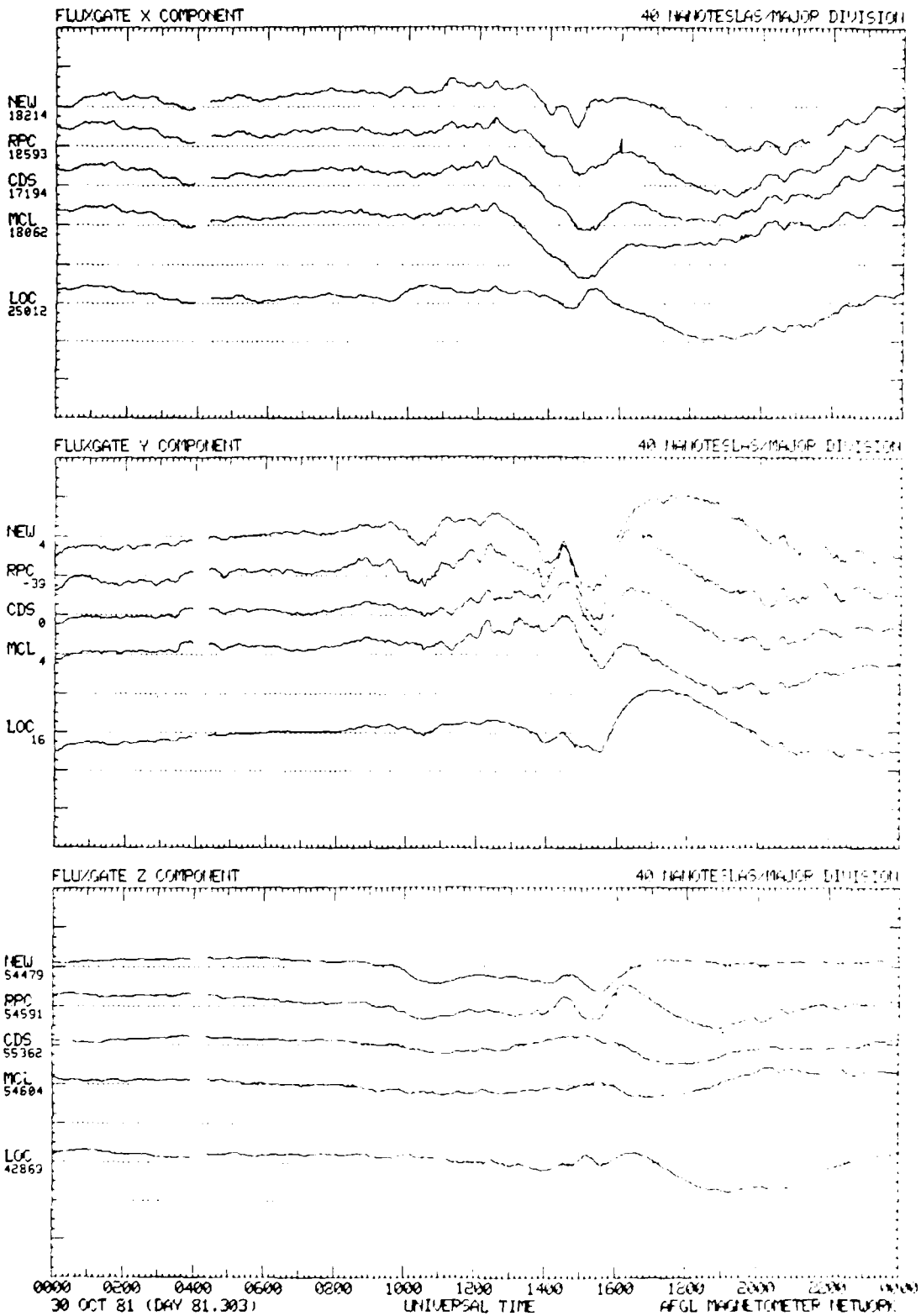


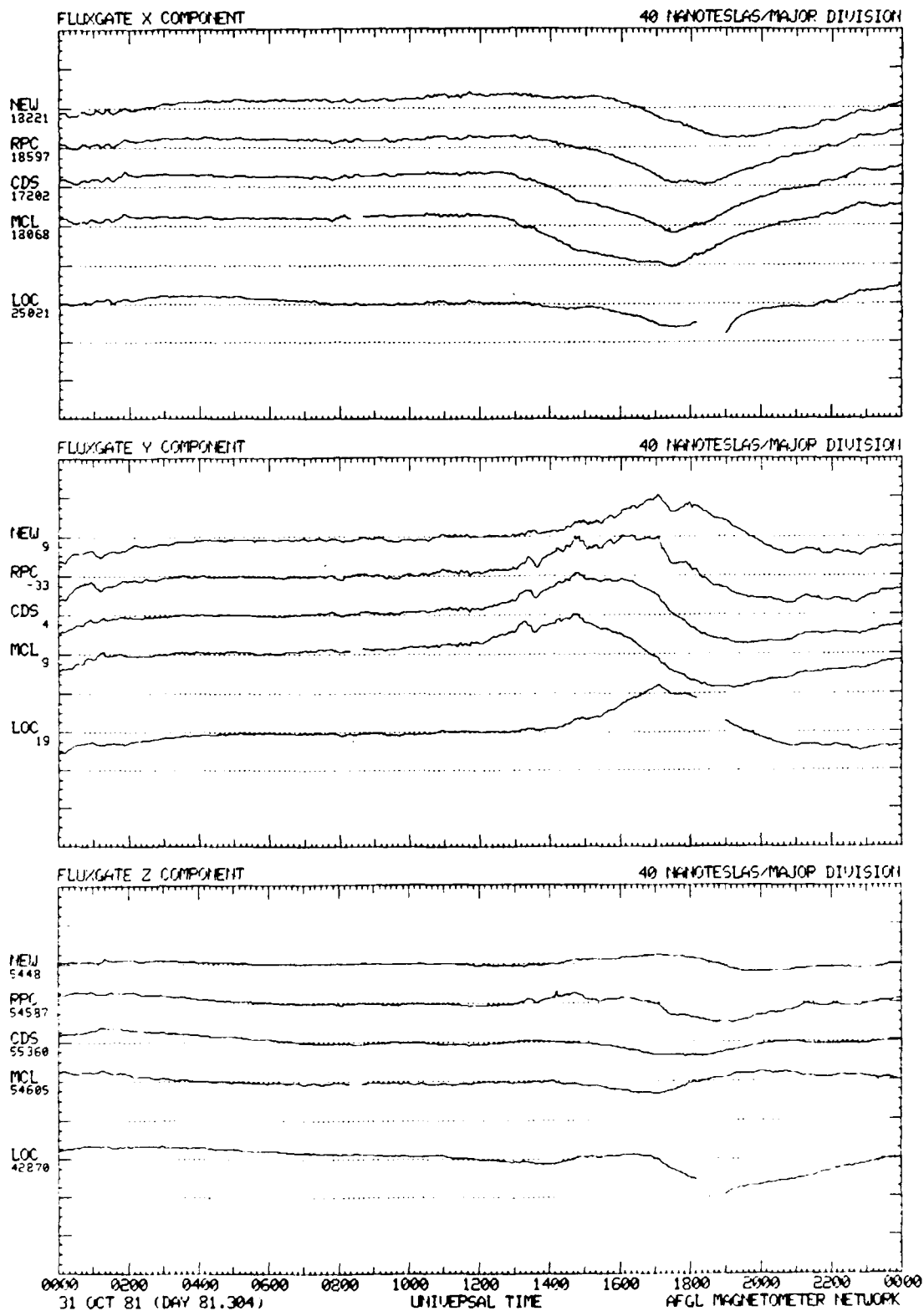




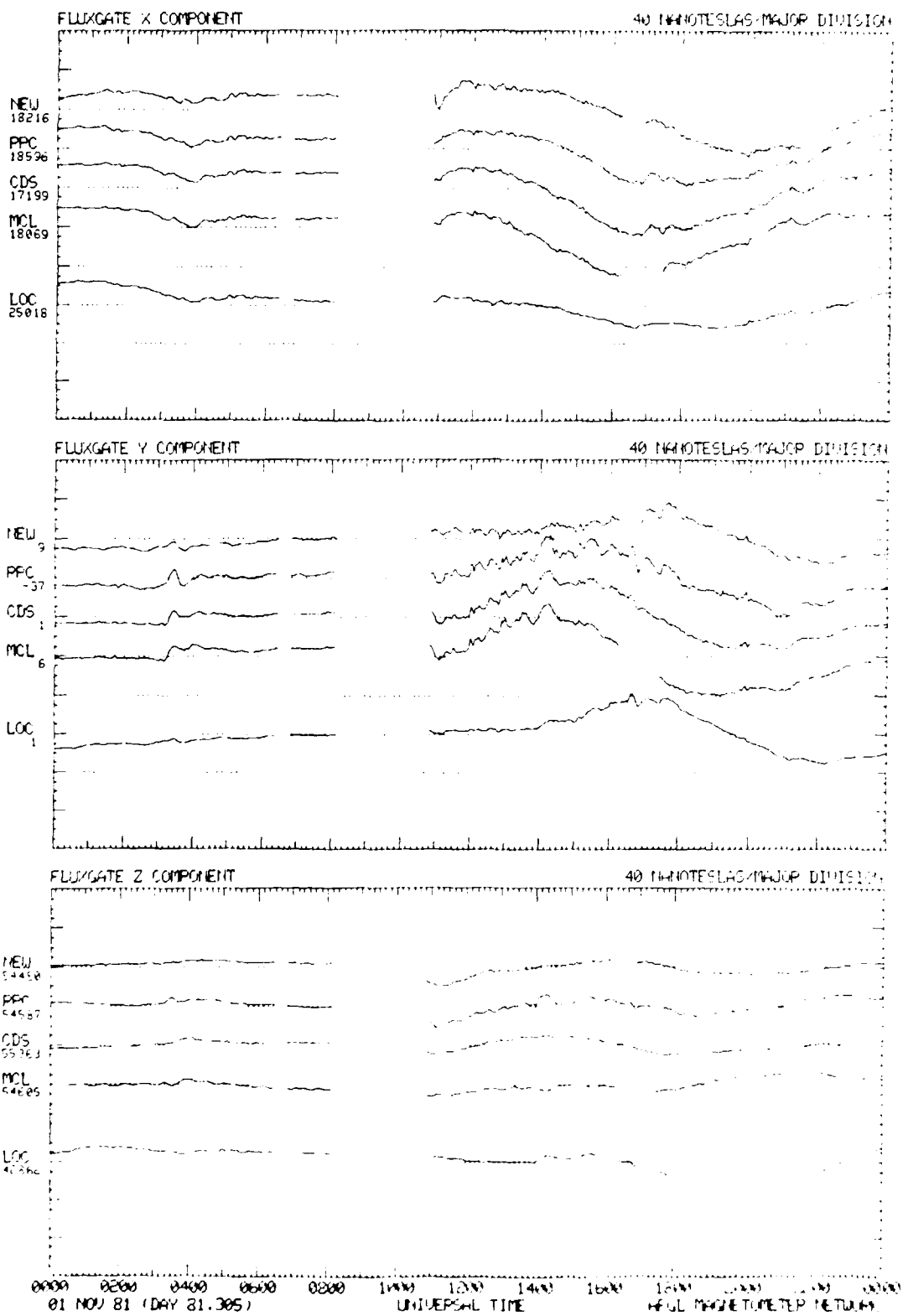


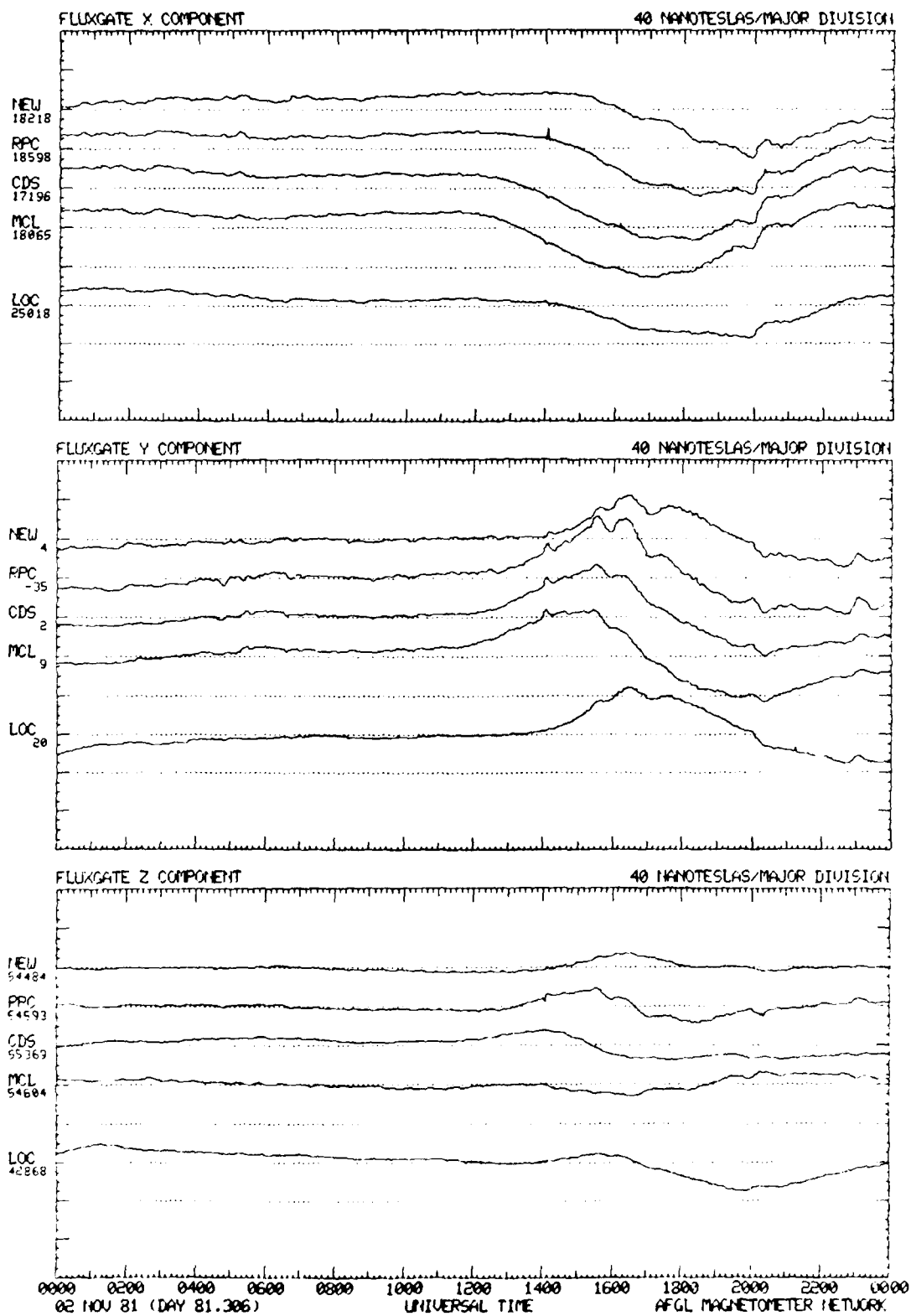


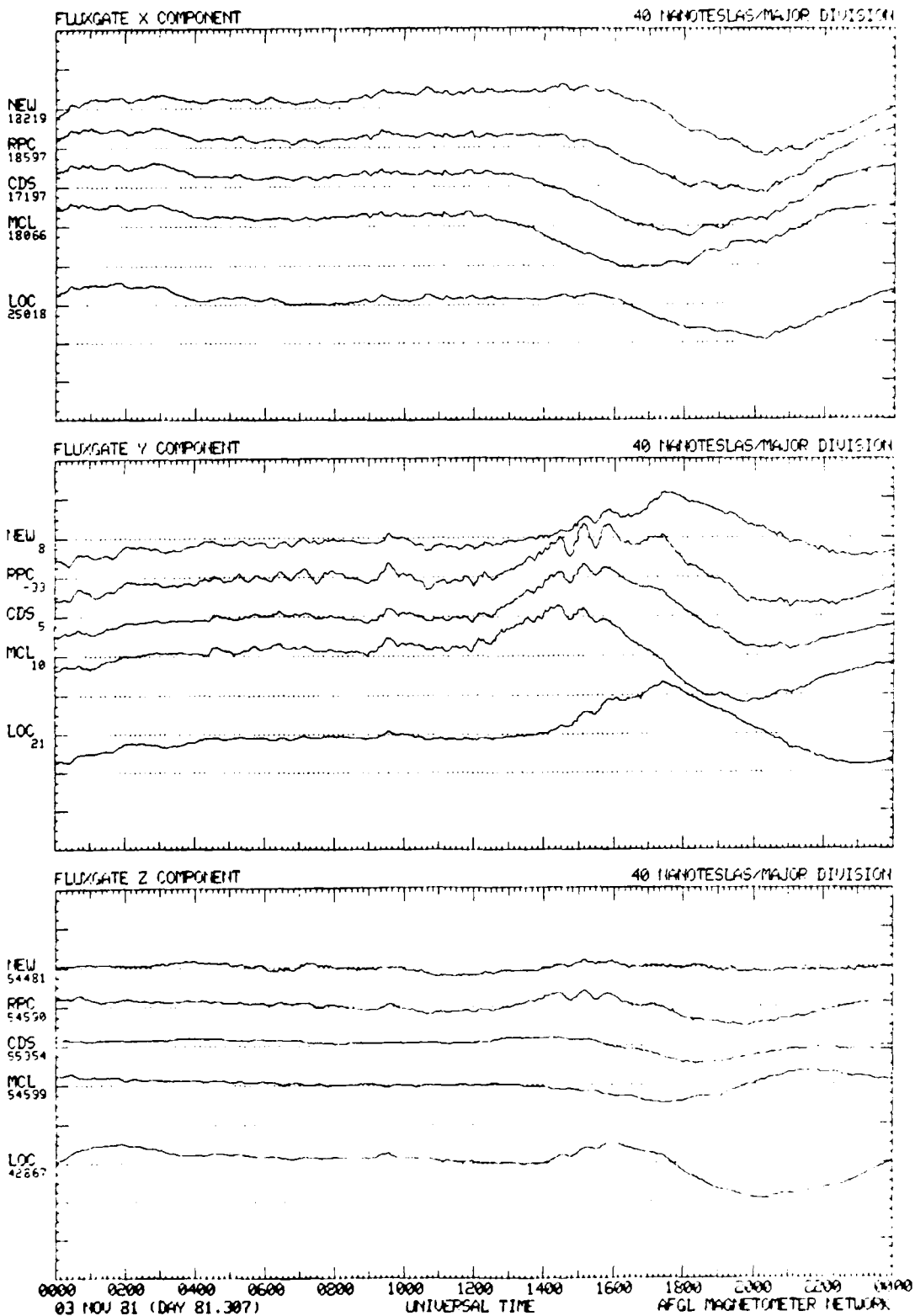


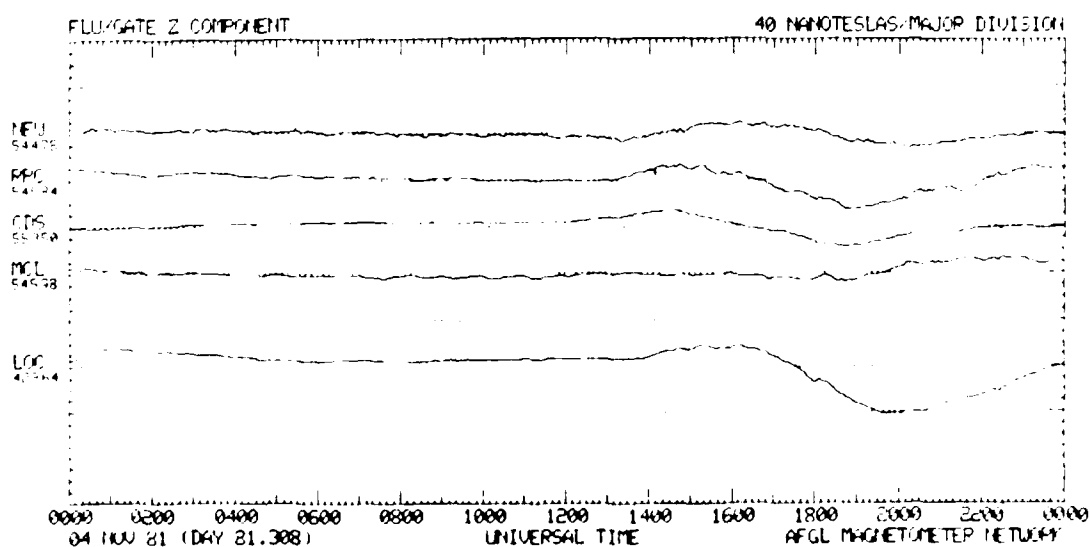
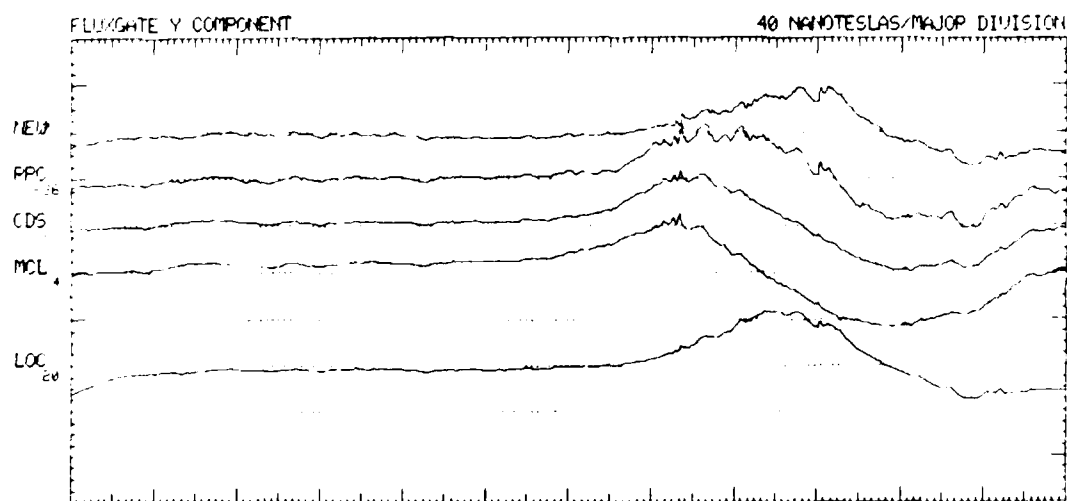
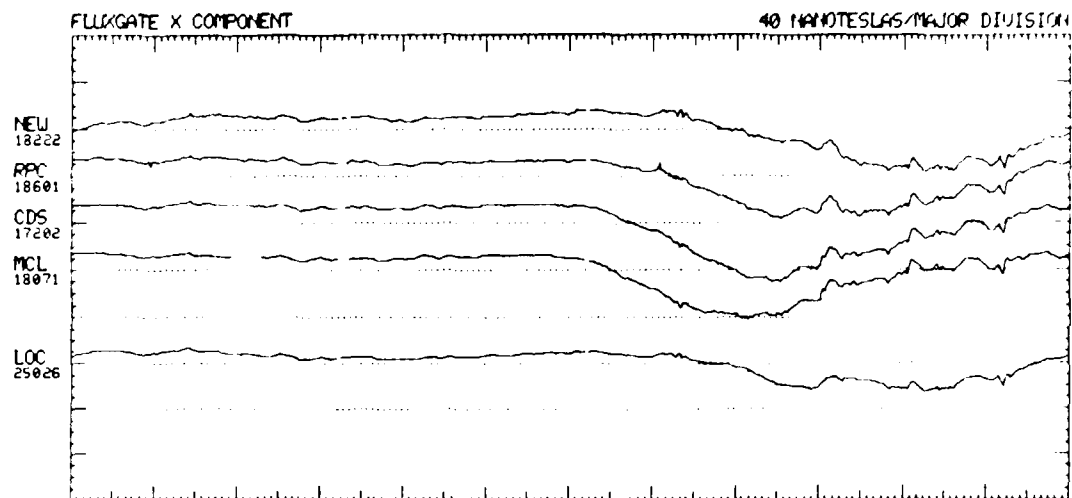


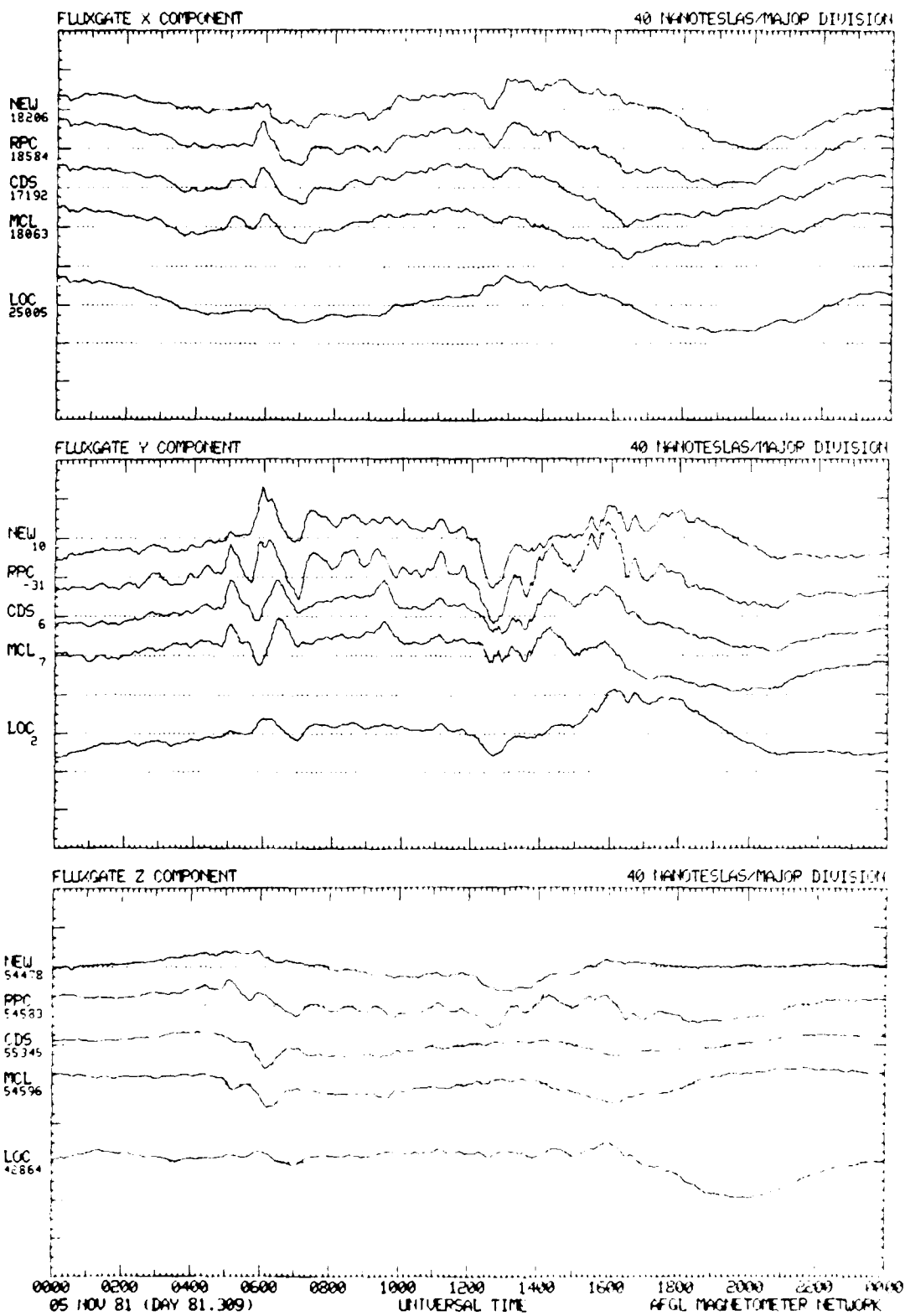


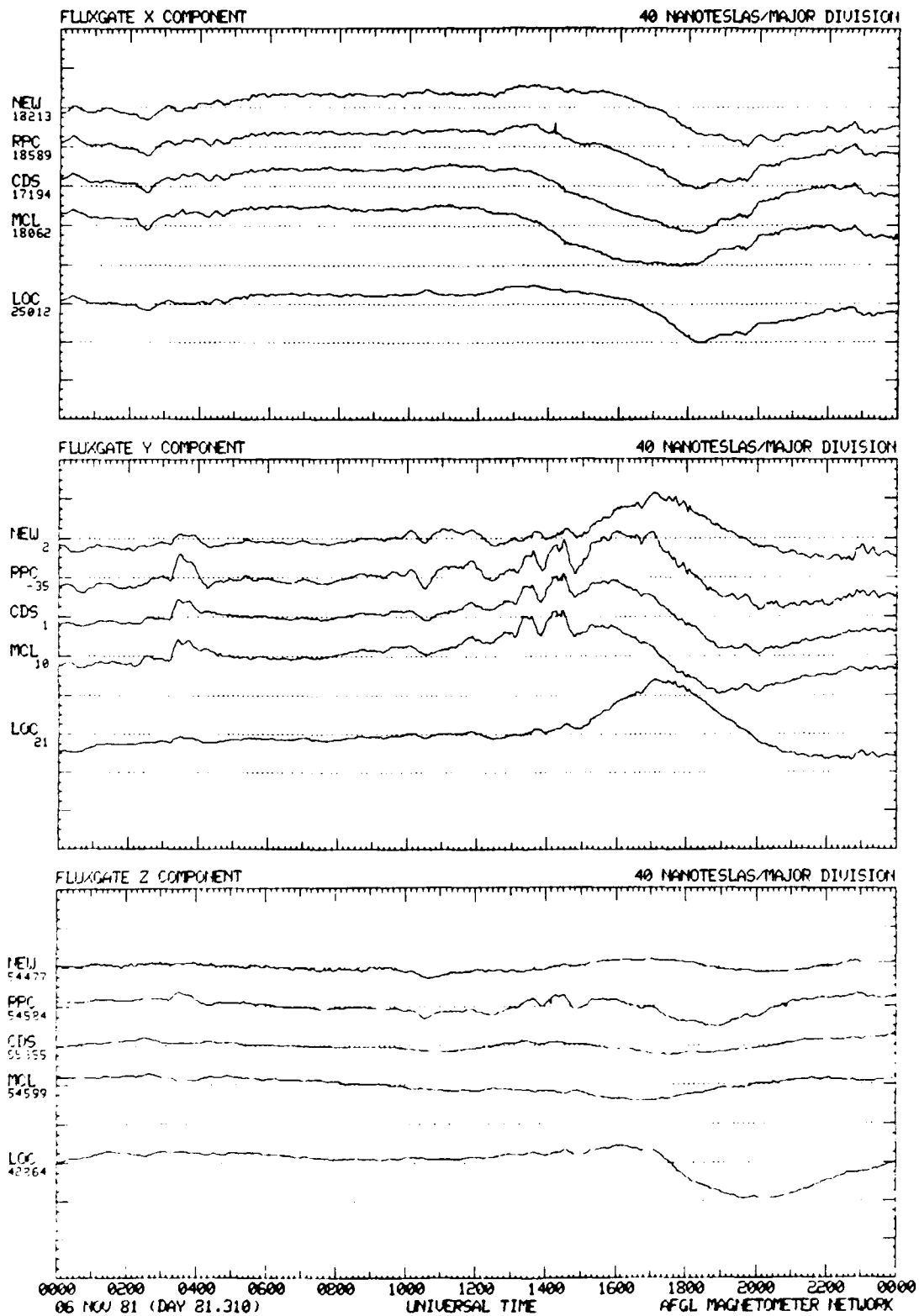


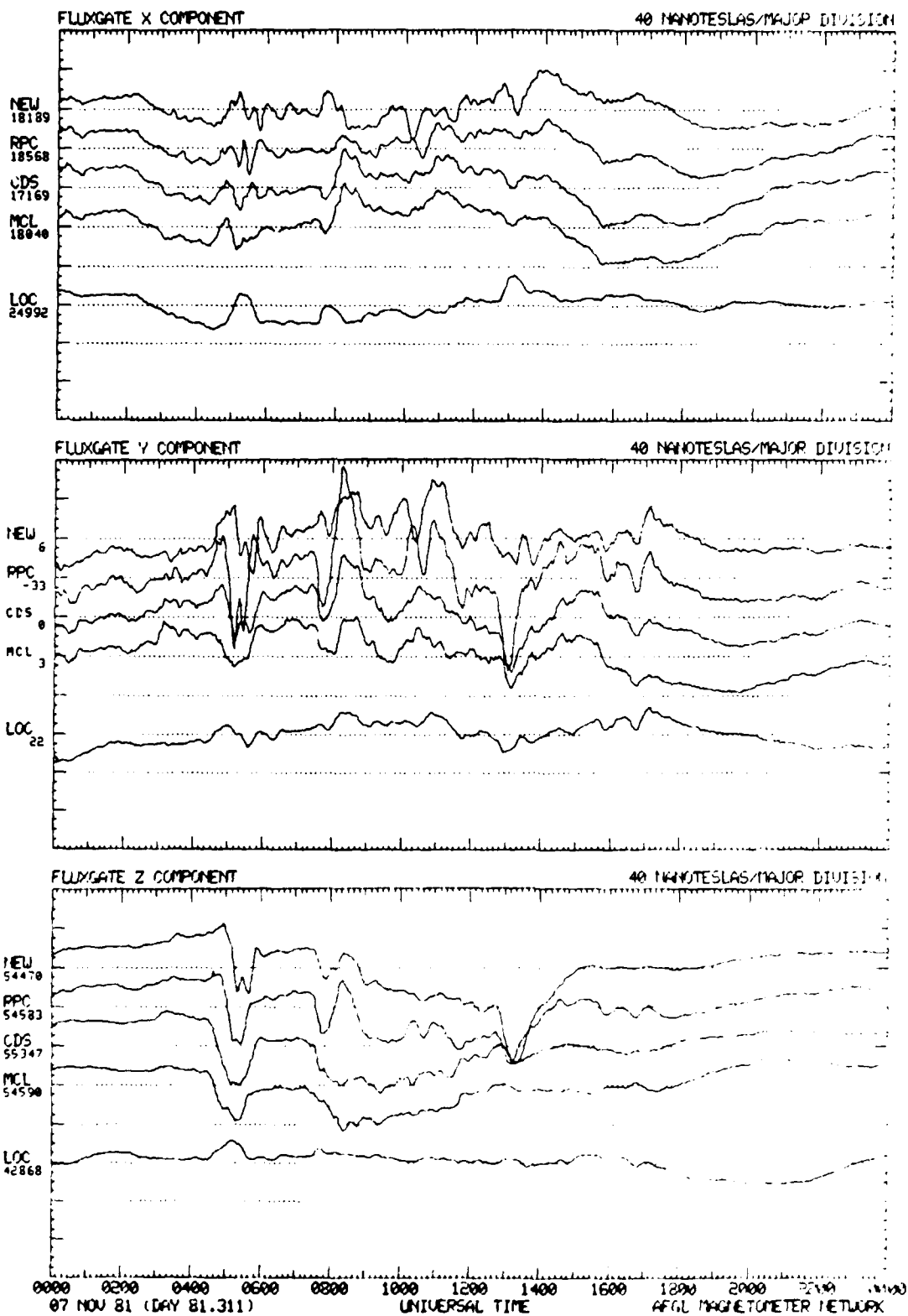


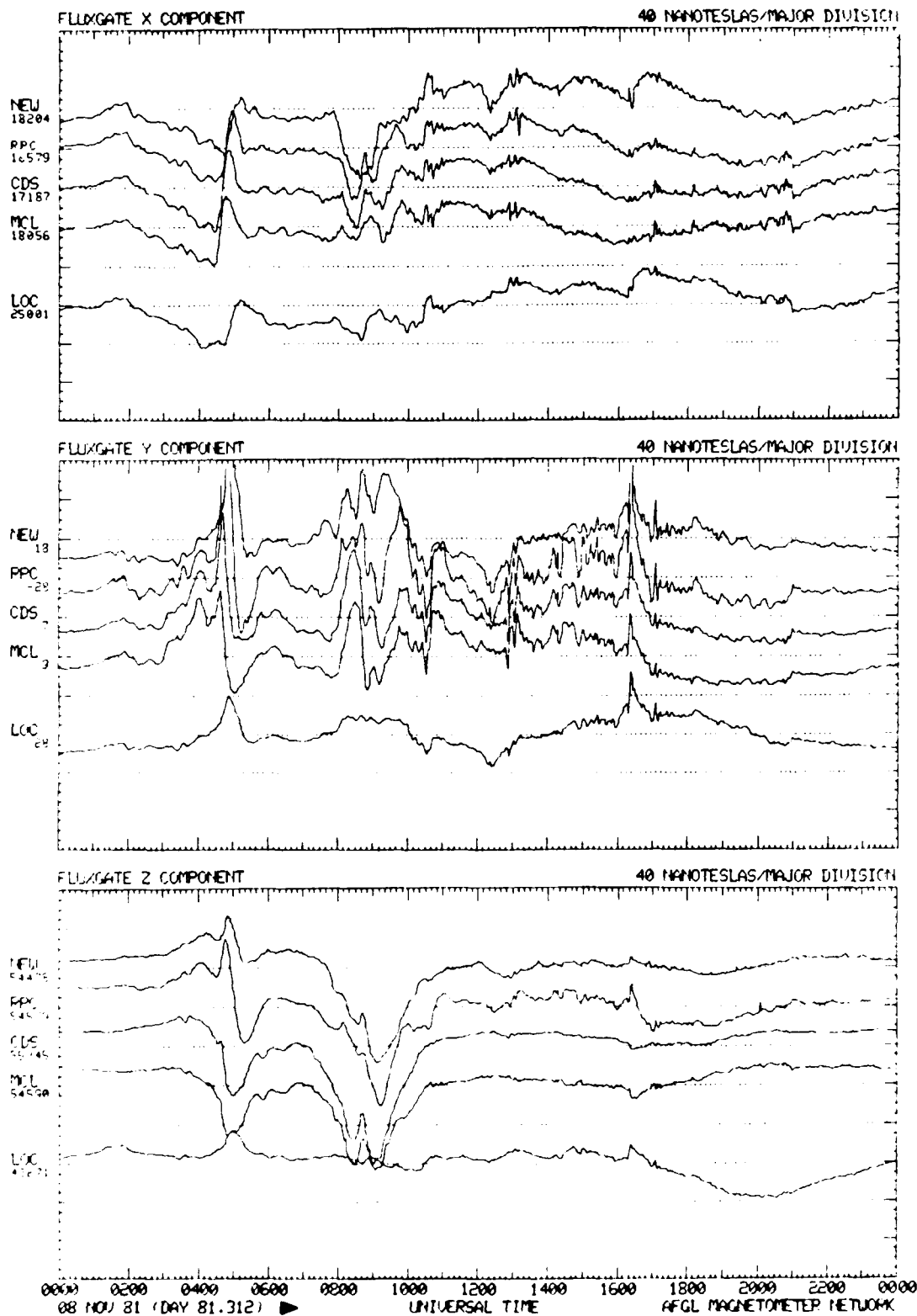




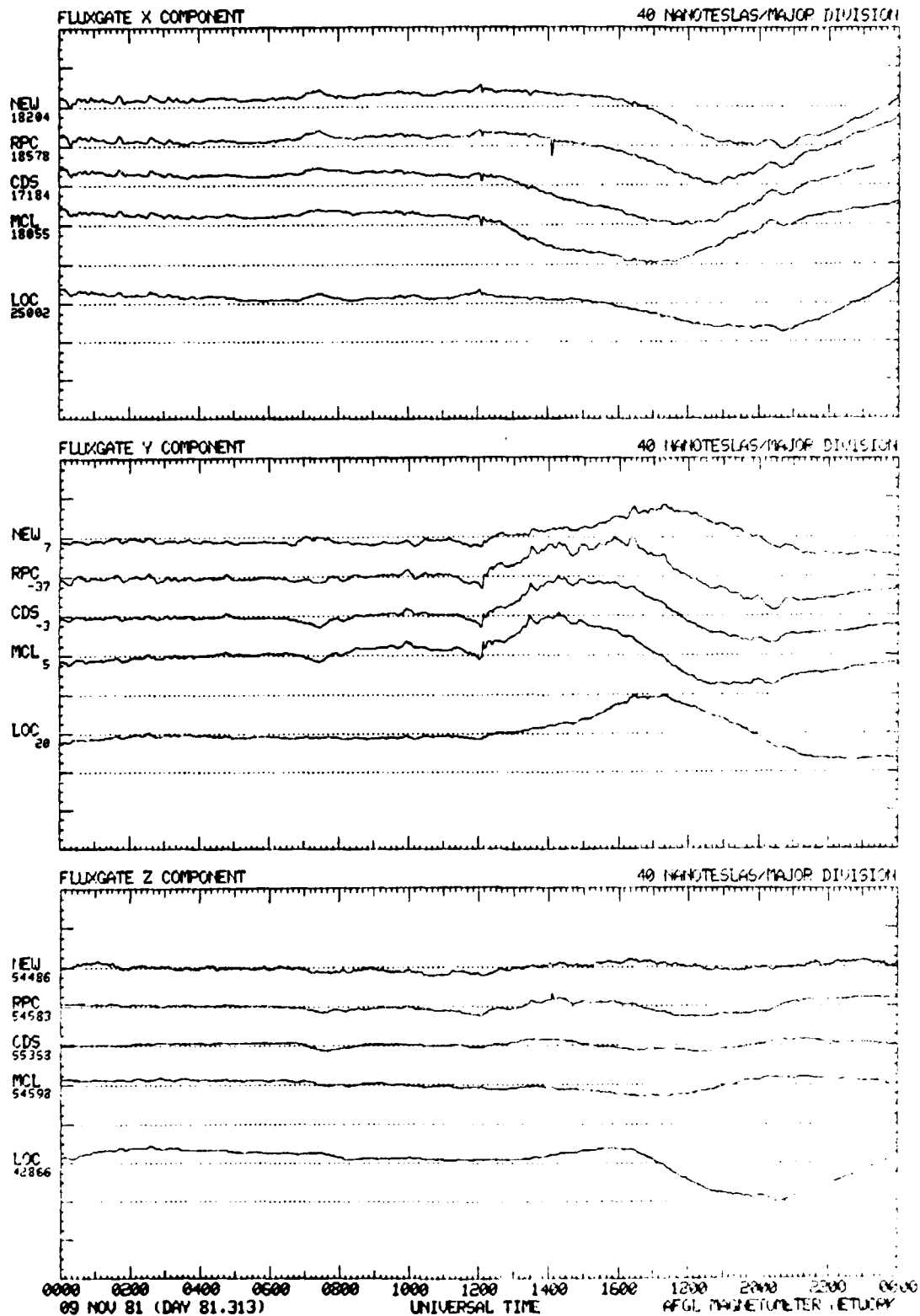


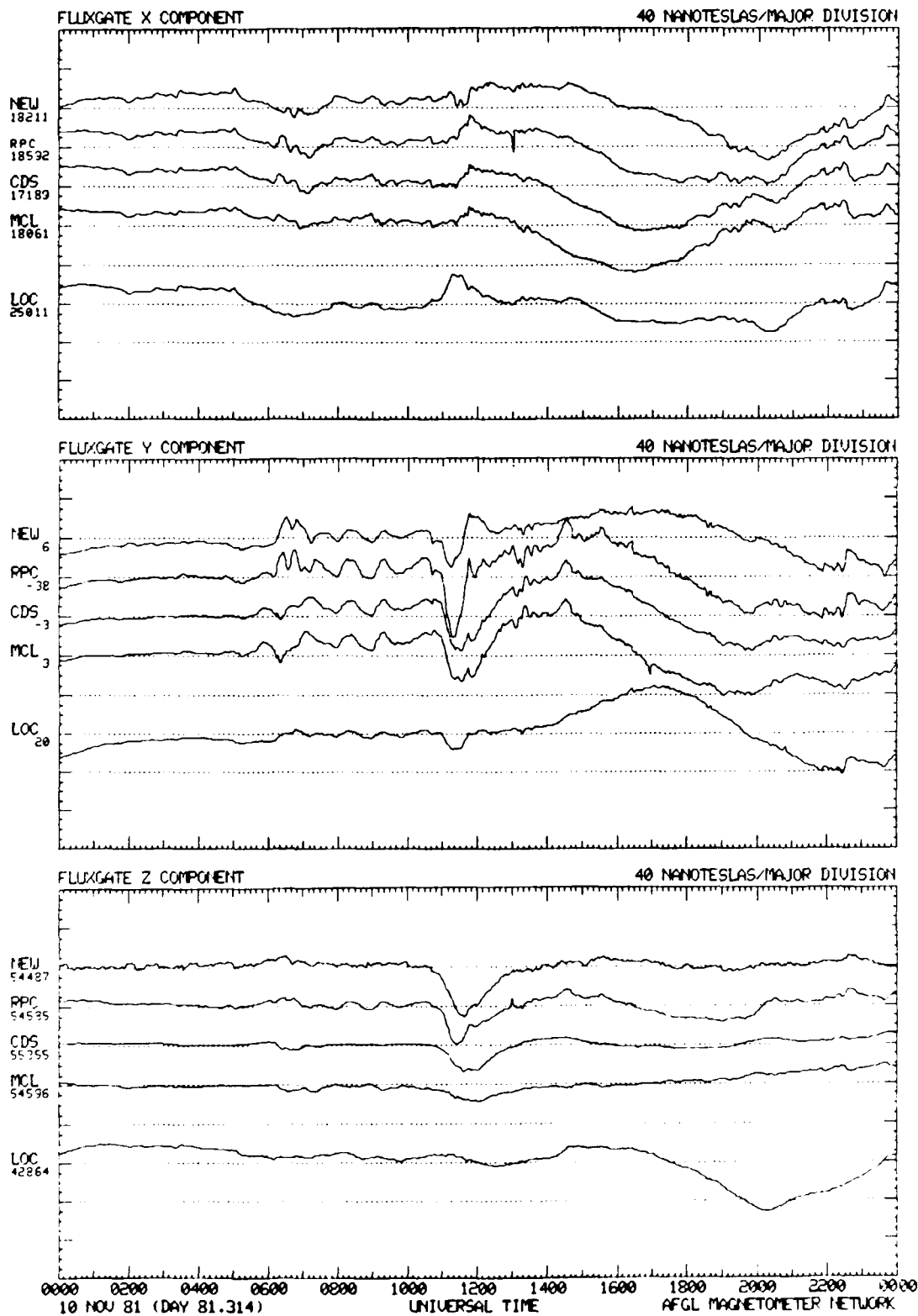


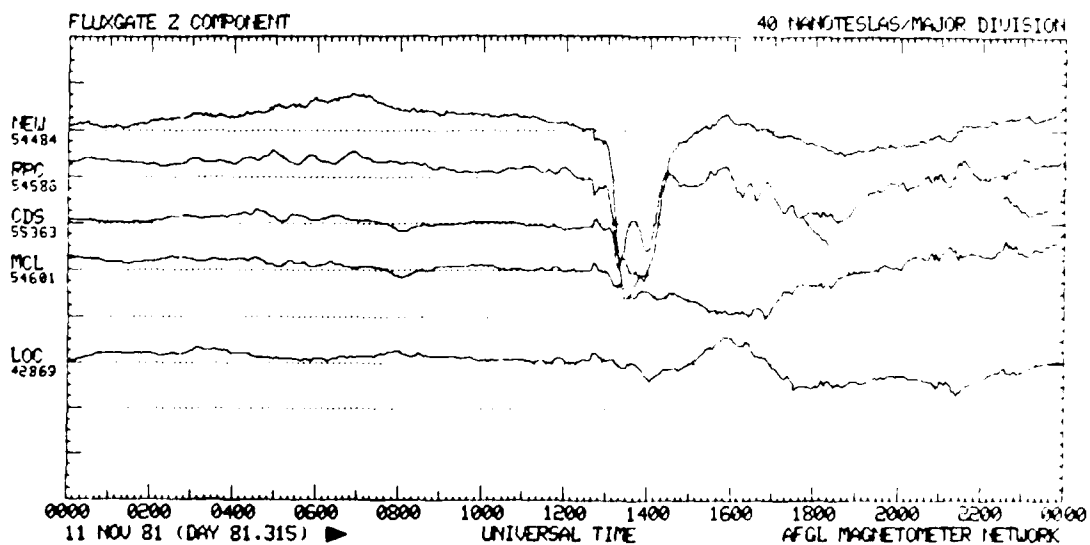
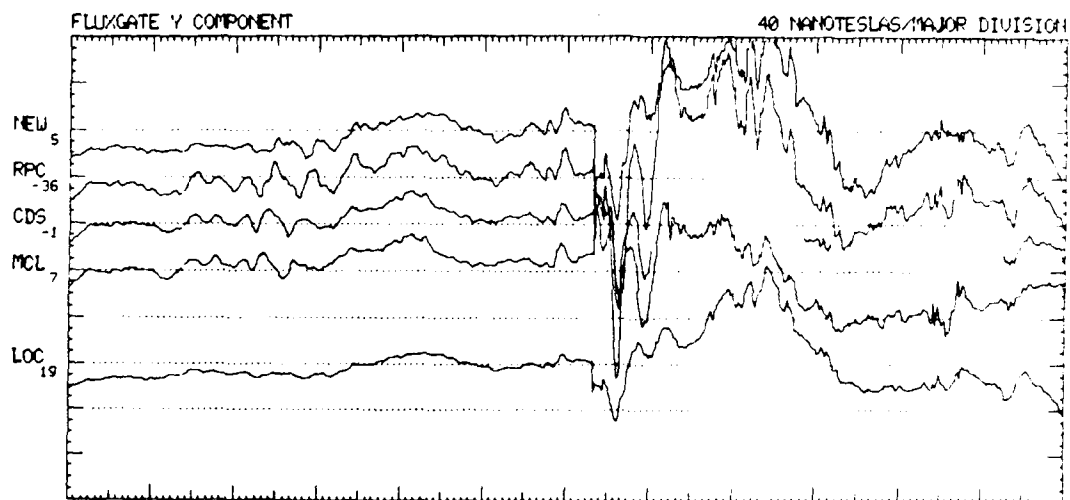
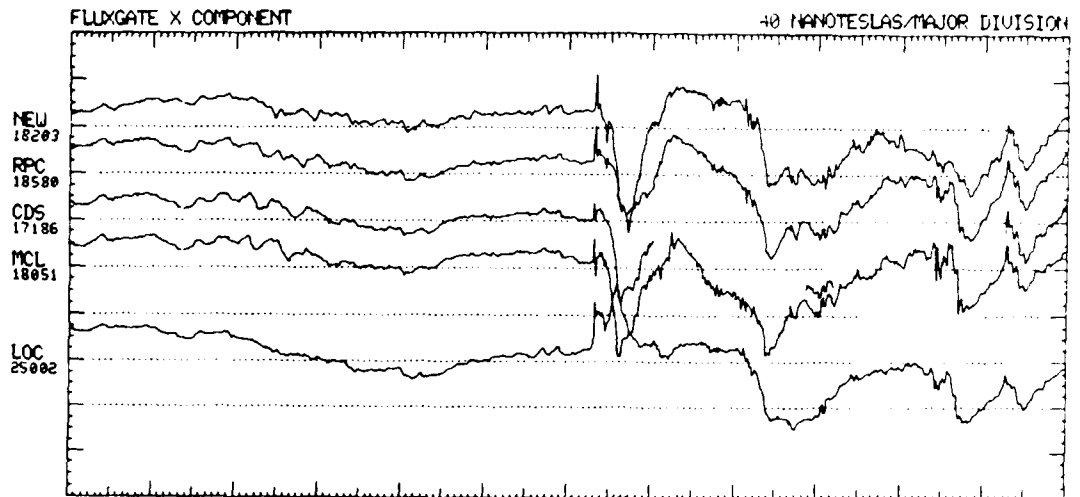


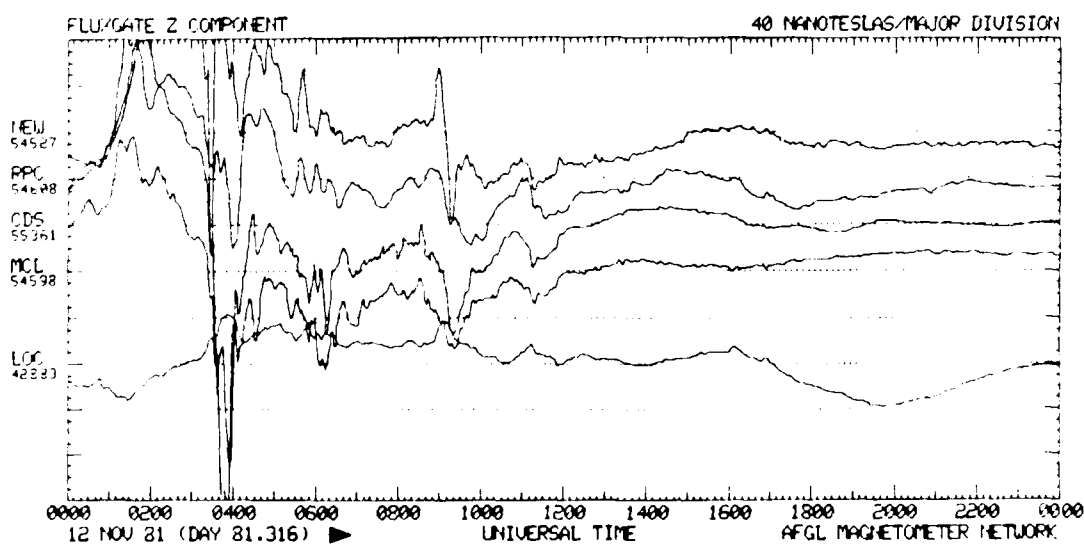
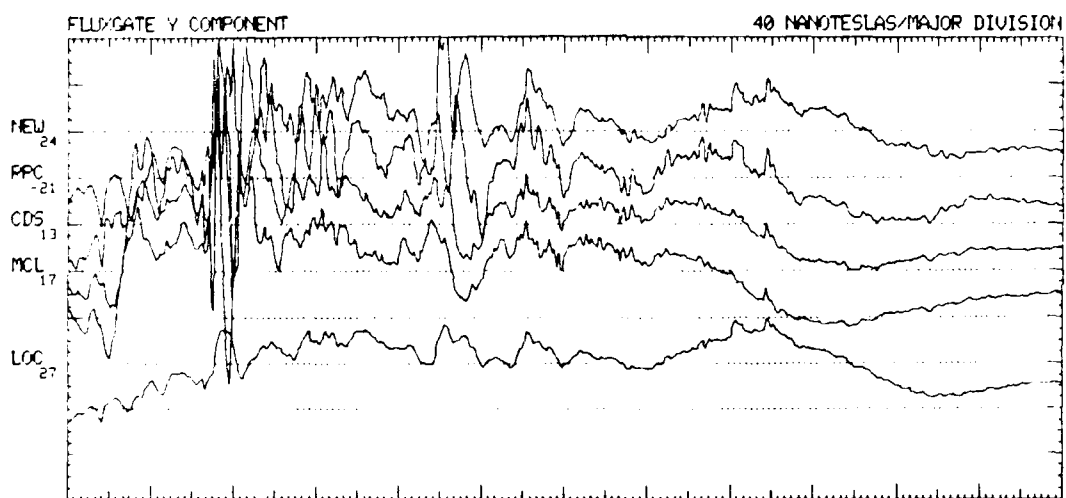
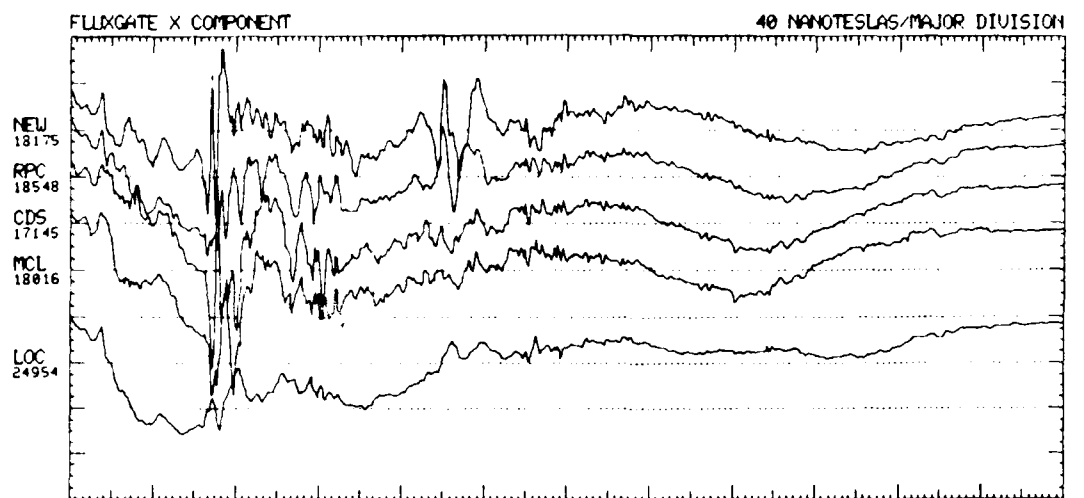




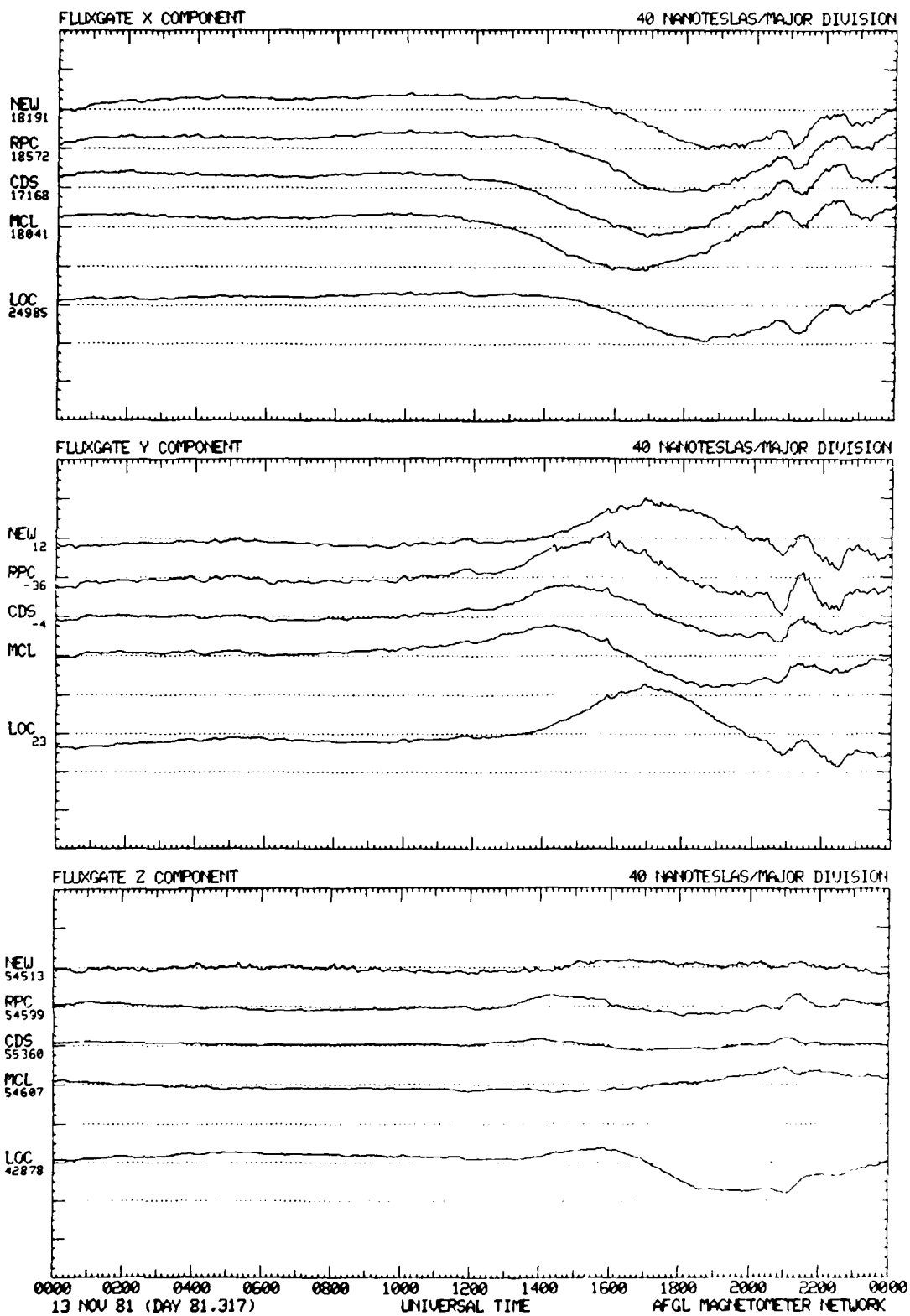


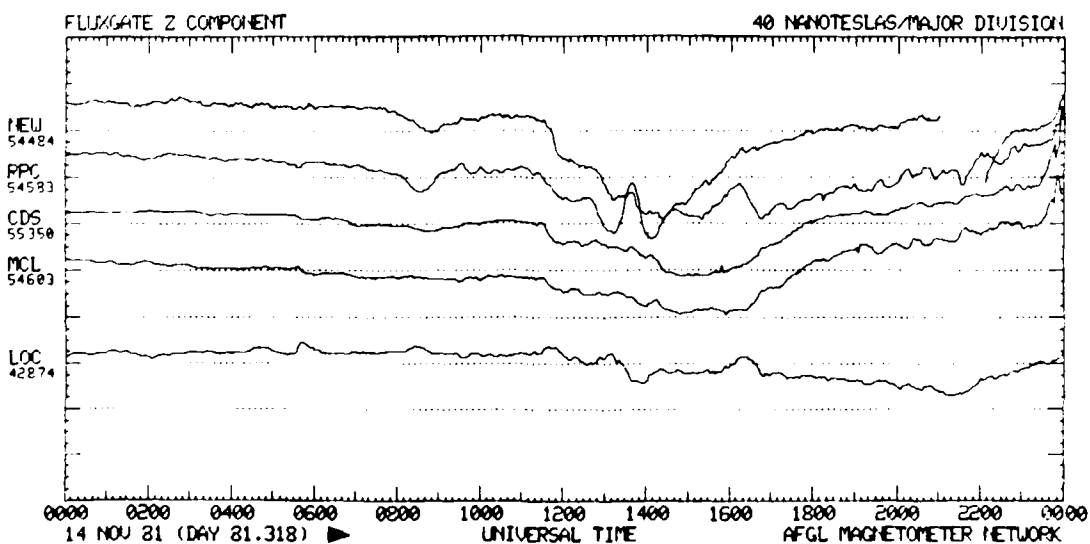
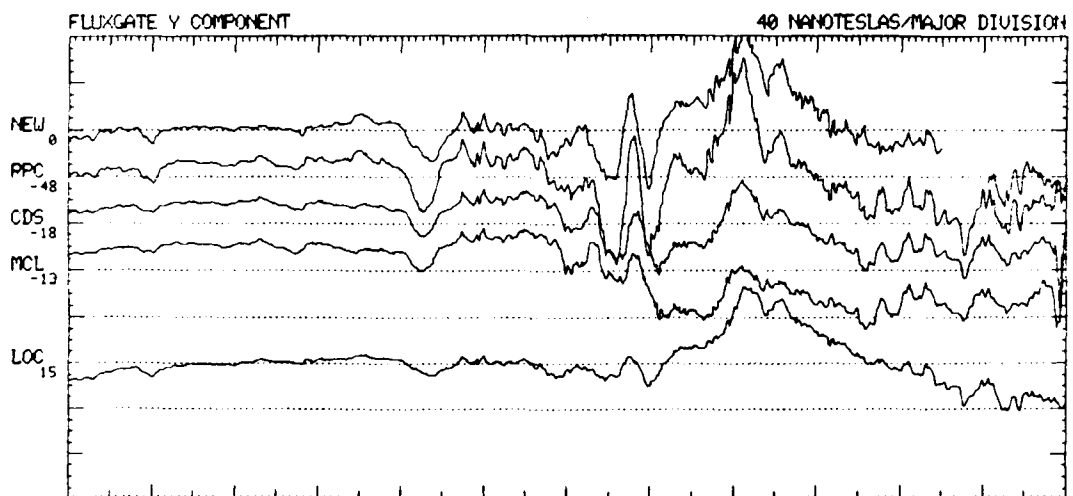
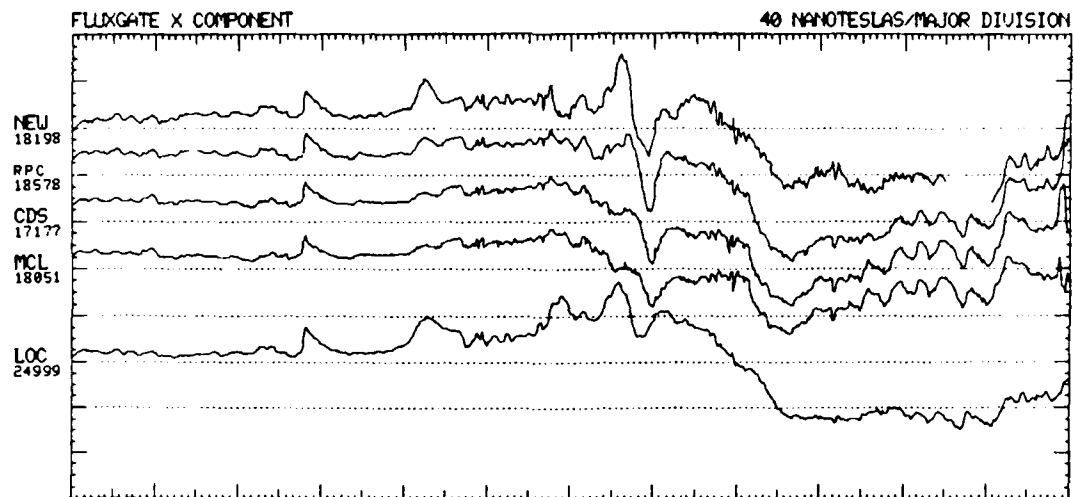


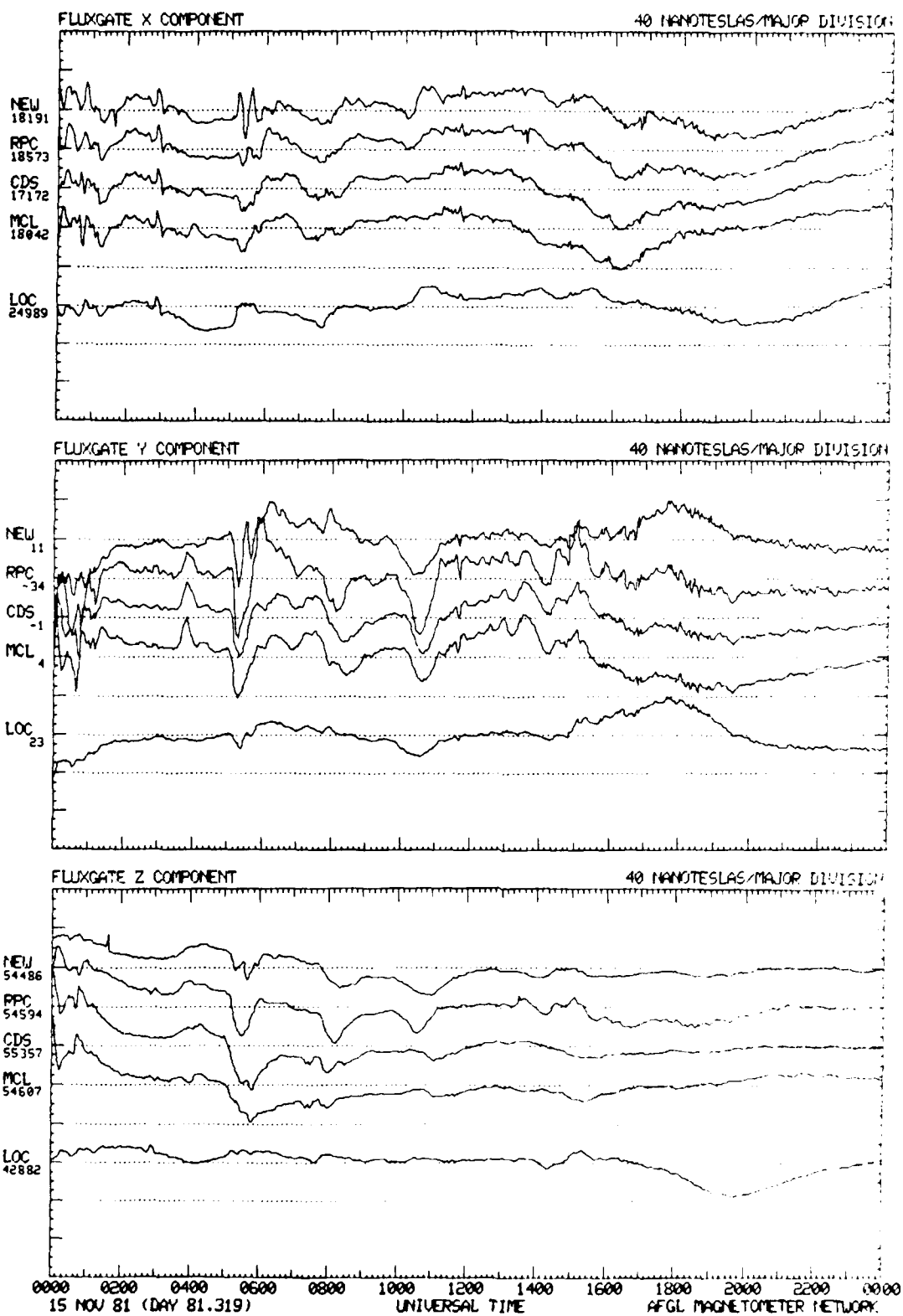


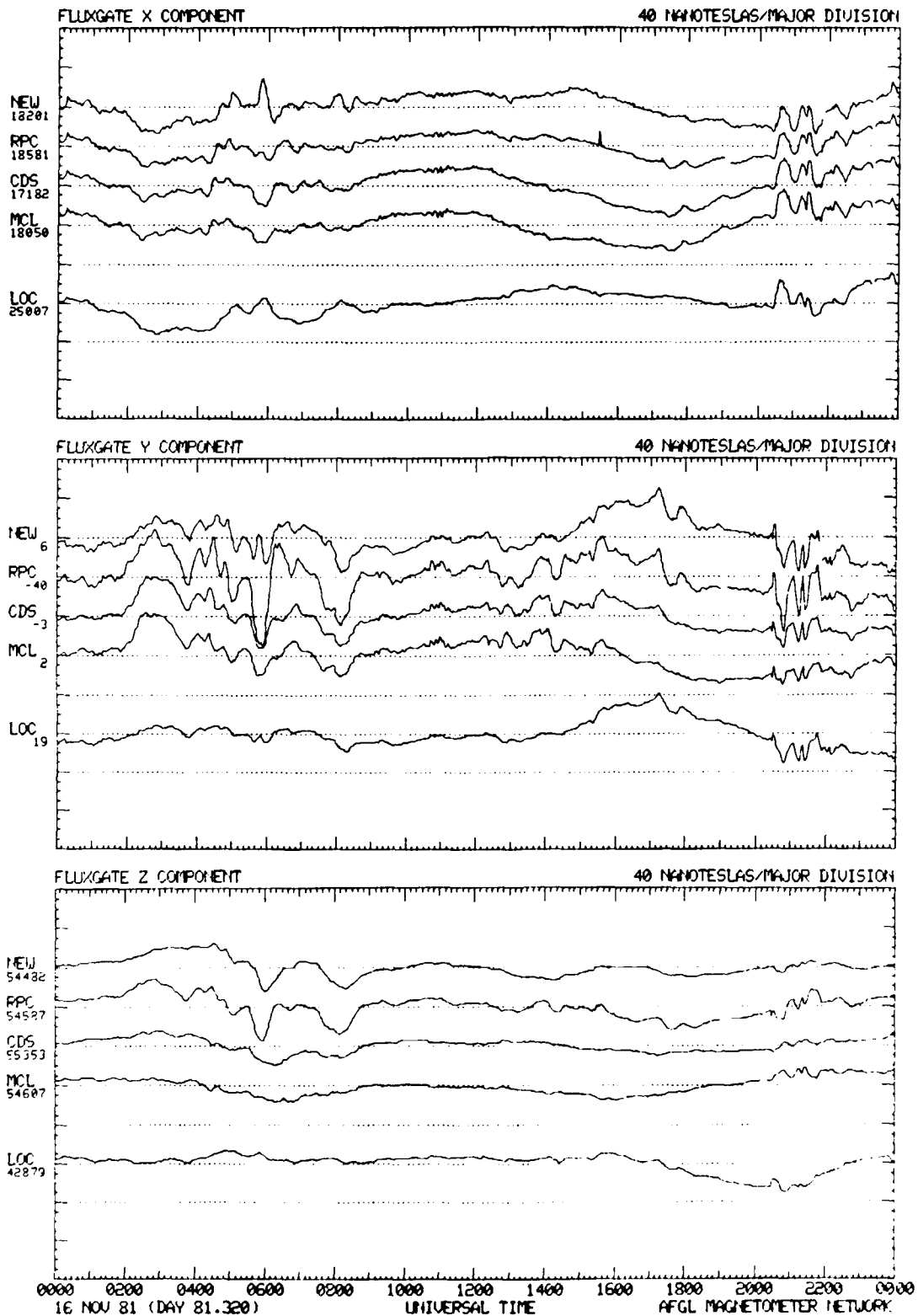


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12 NOV 81 (DAY 81.316) ► UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

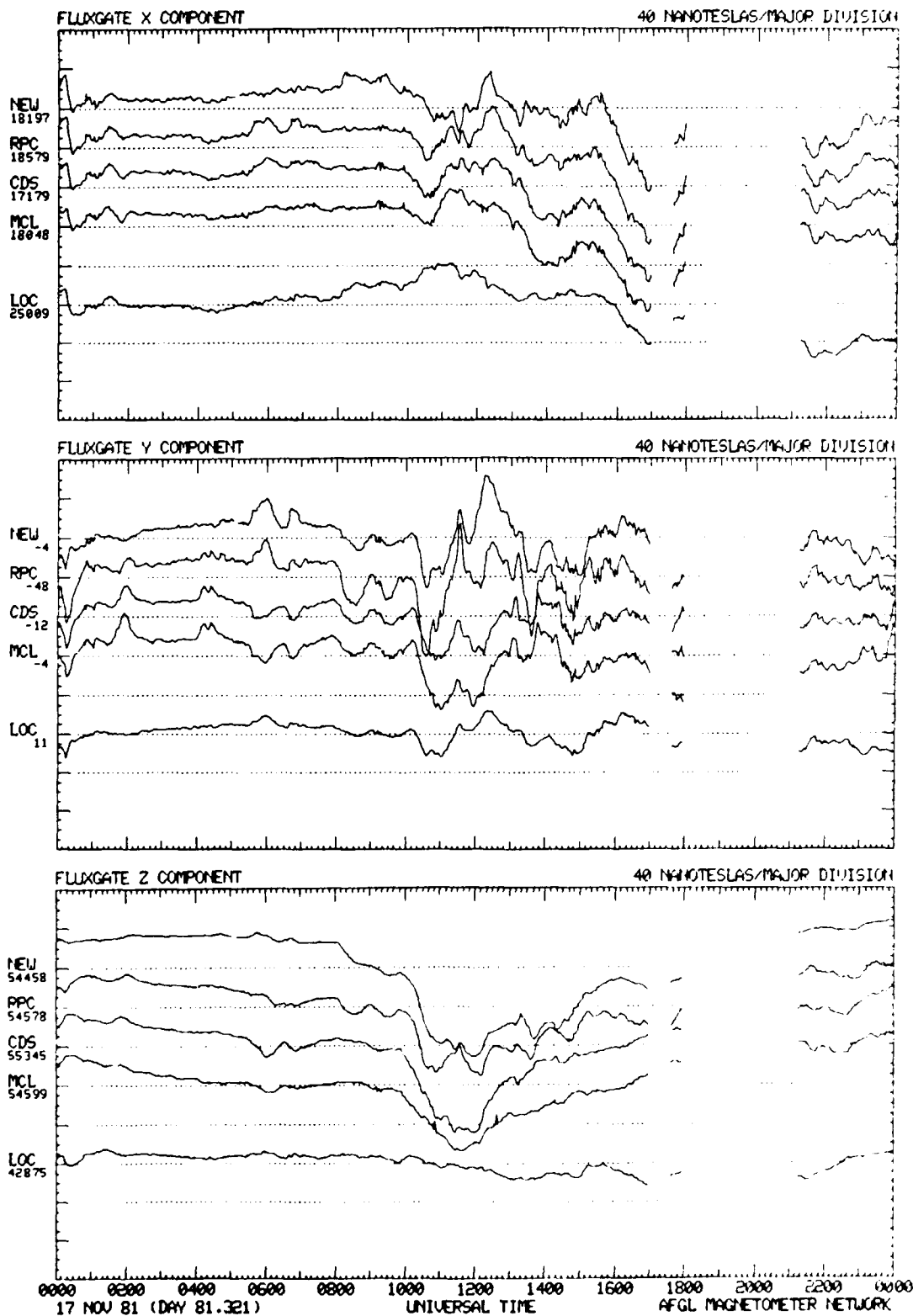


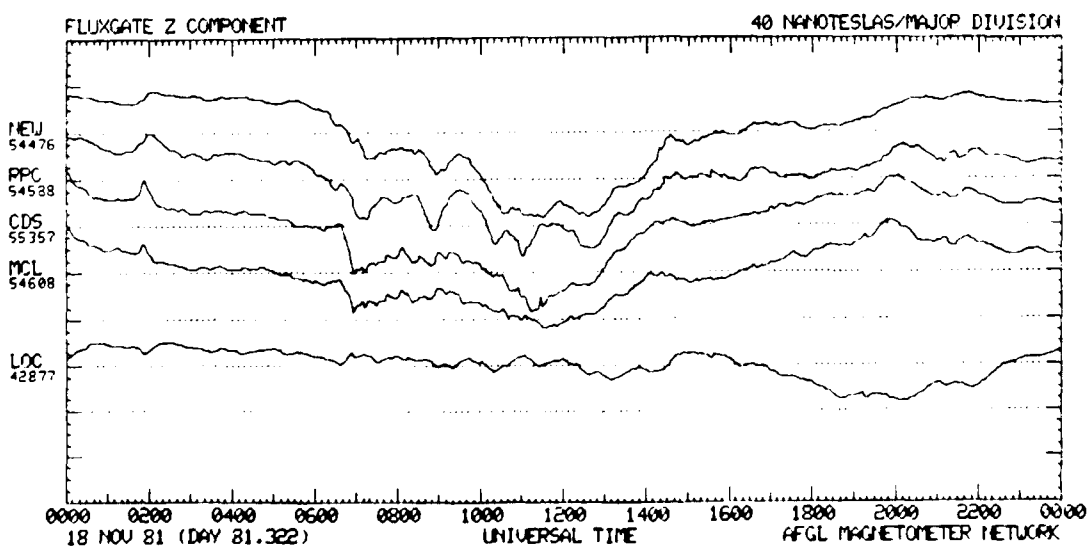
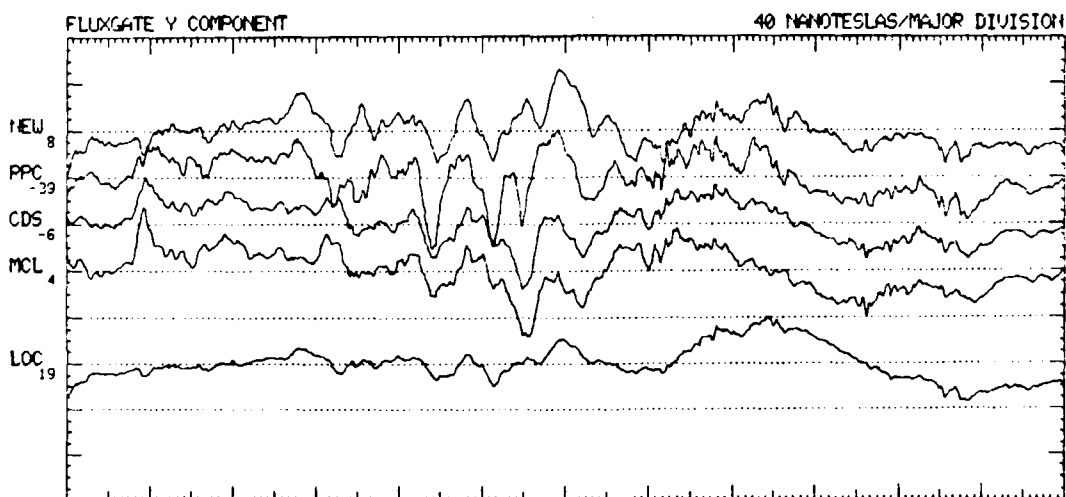
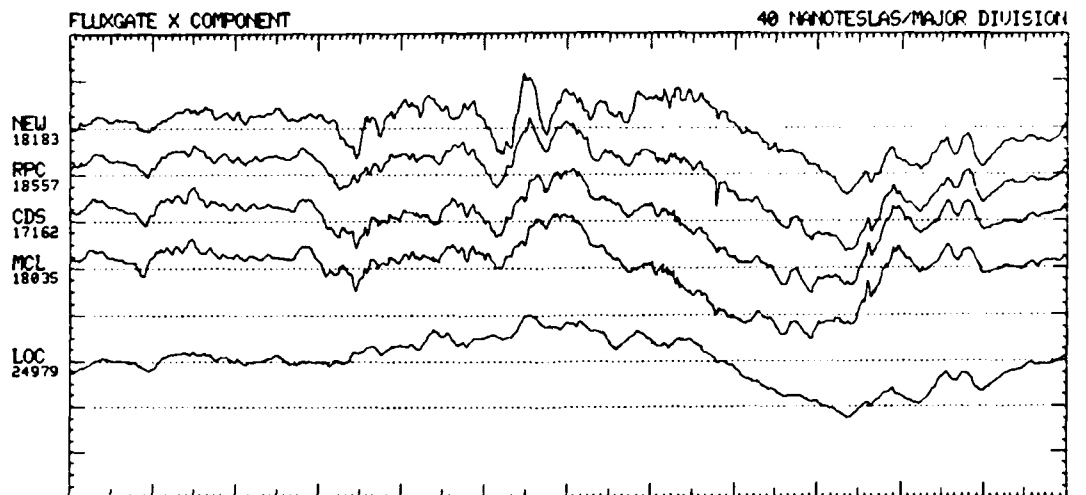


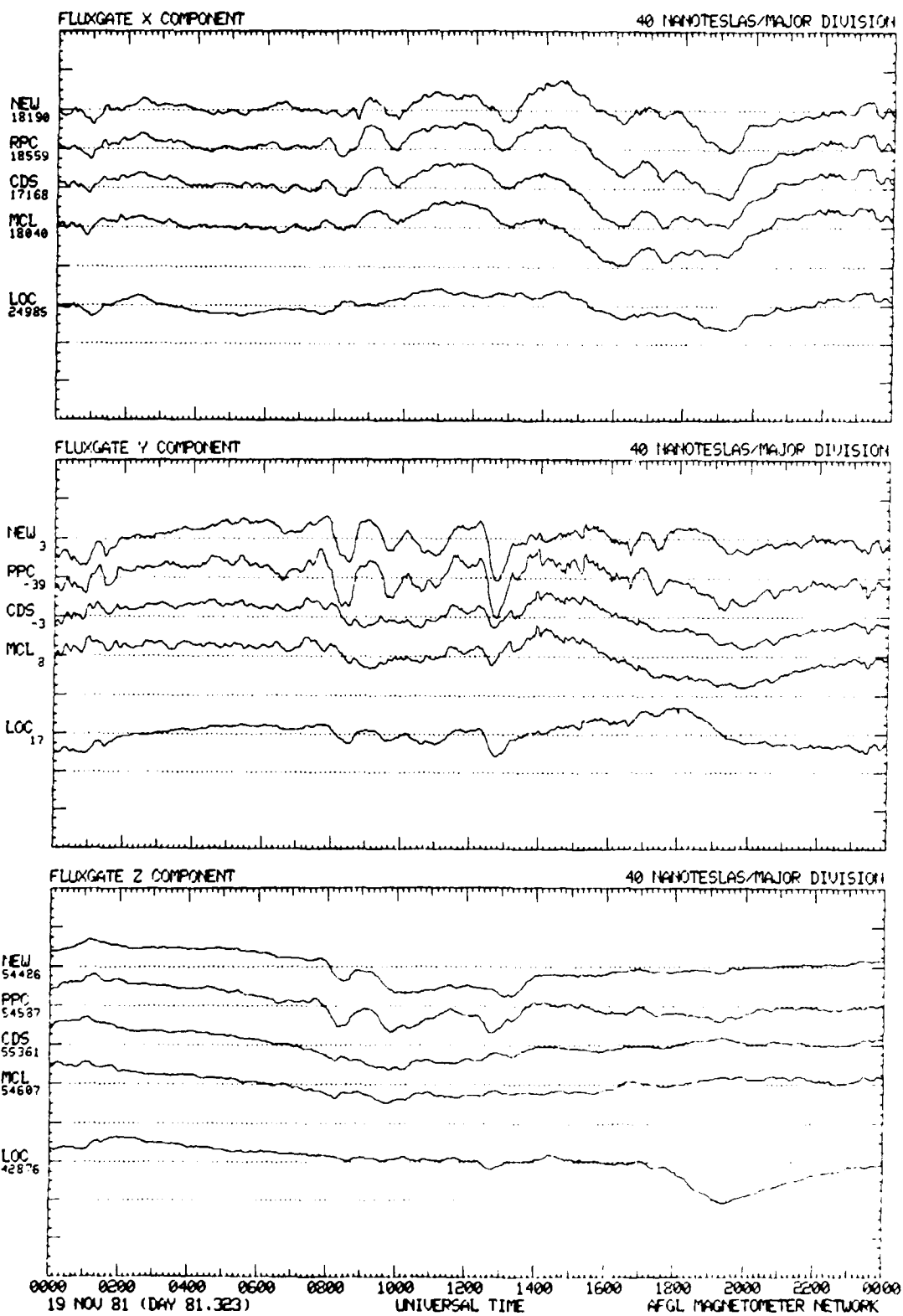


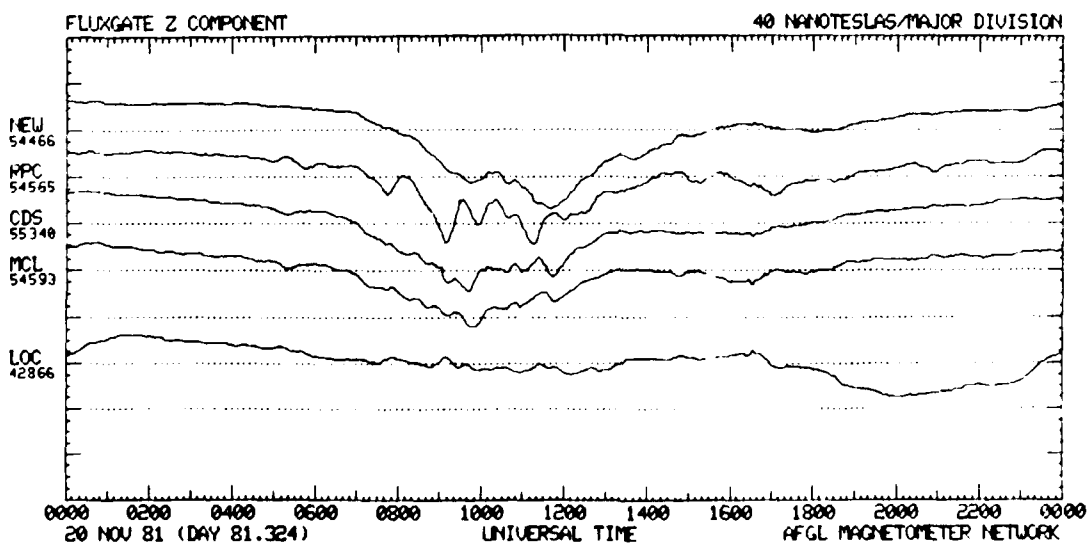
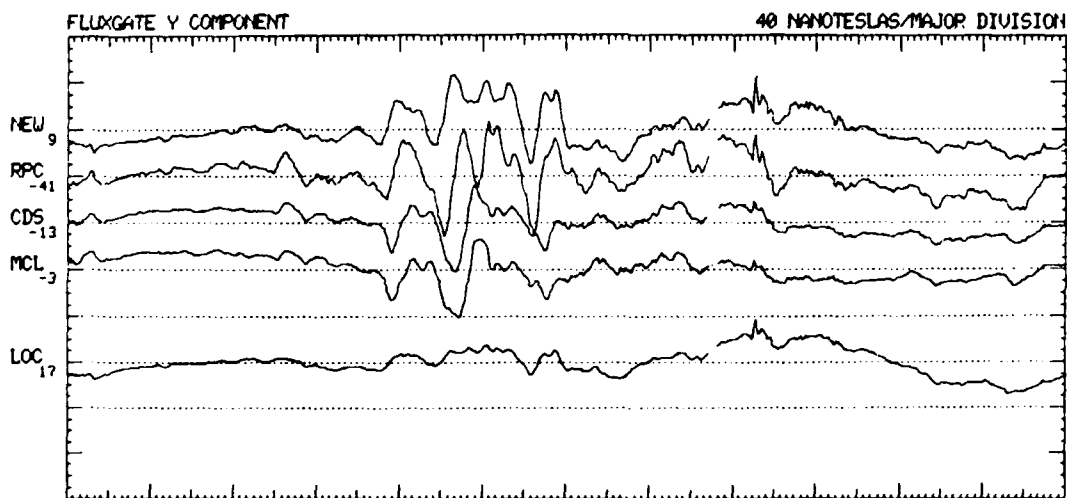
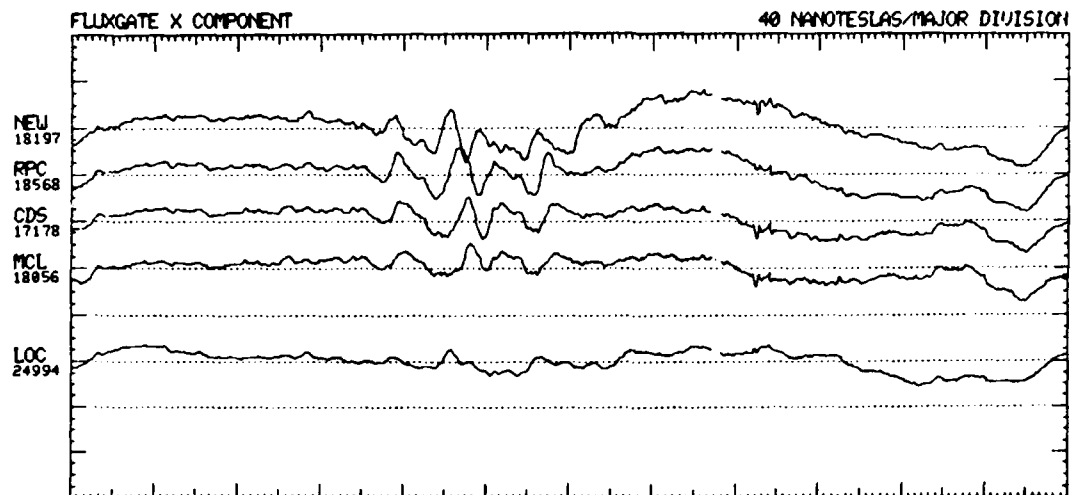


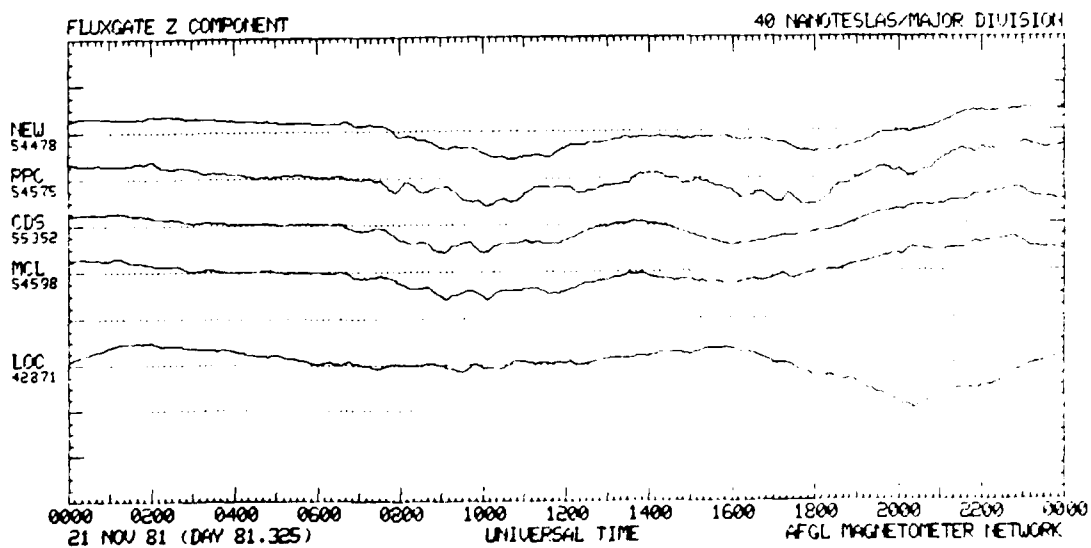
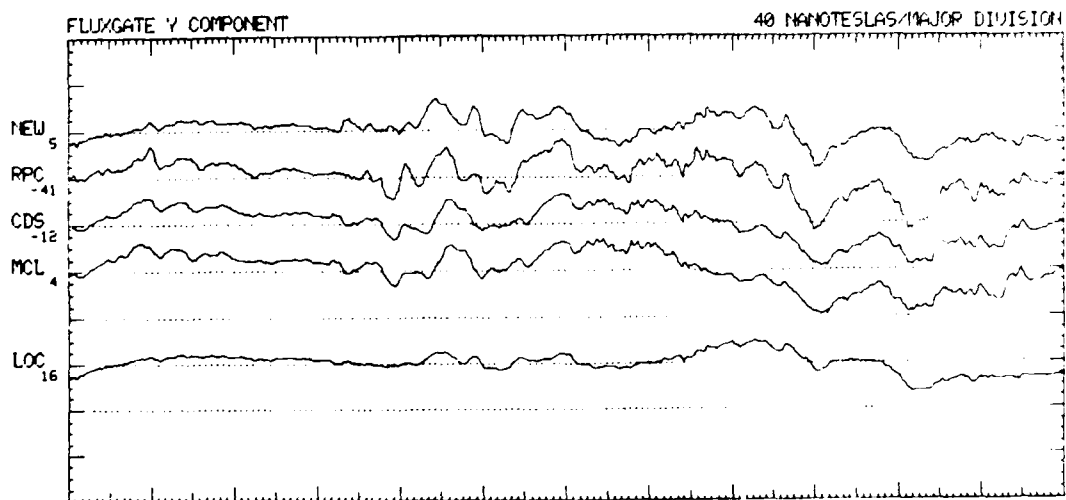
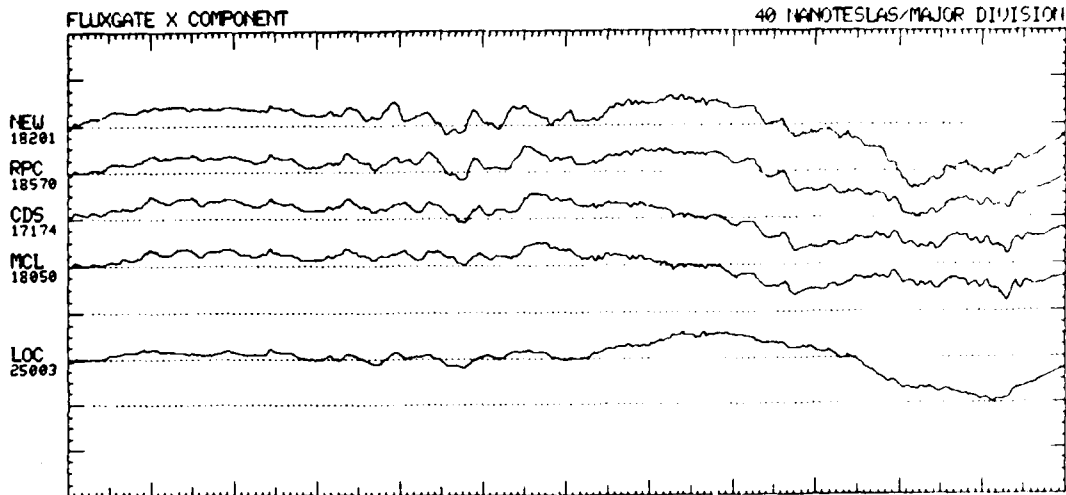


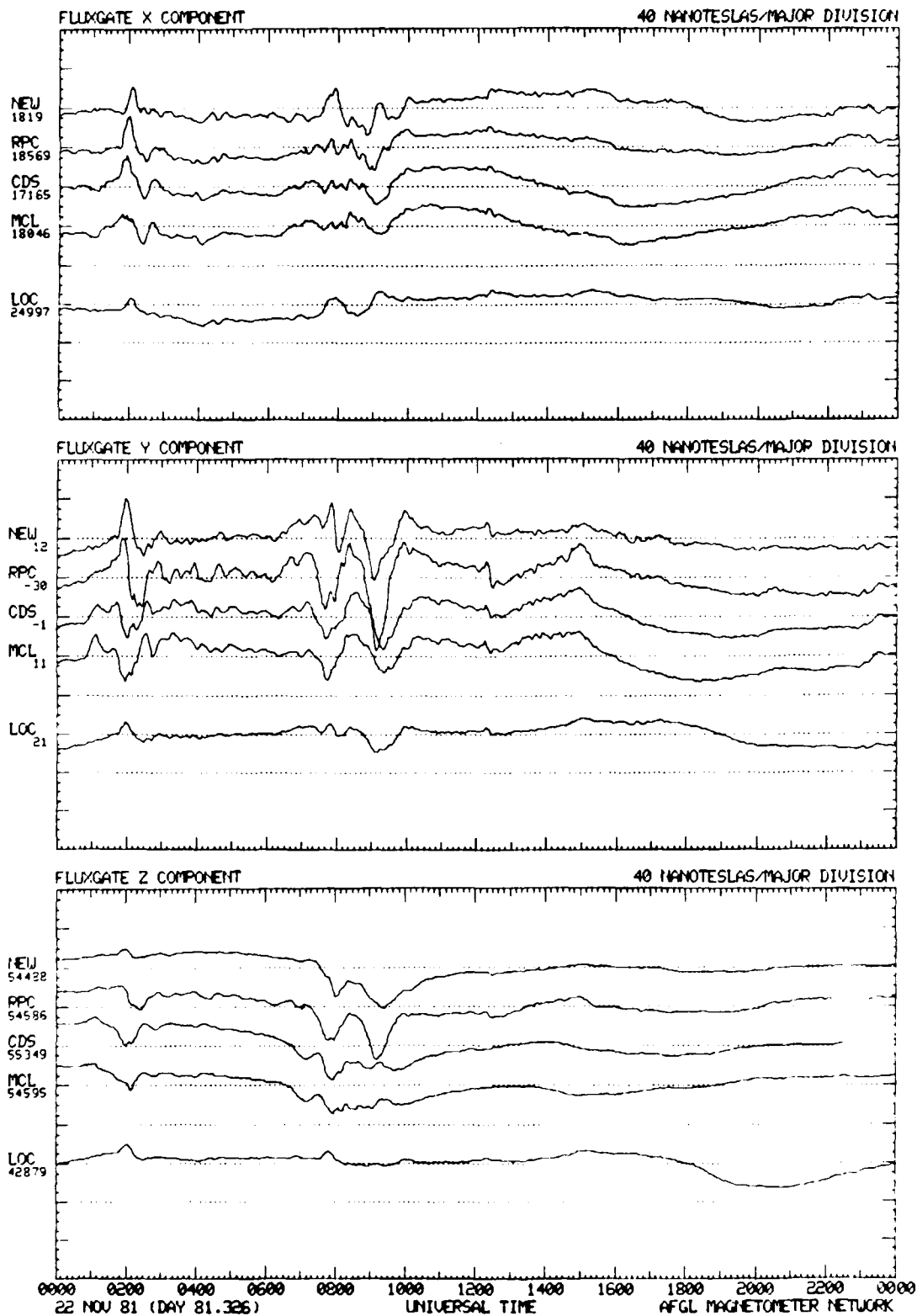


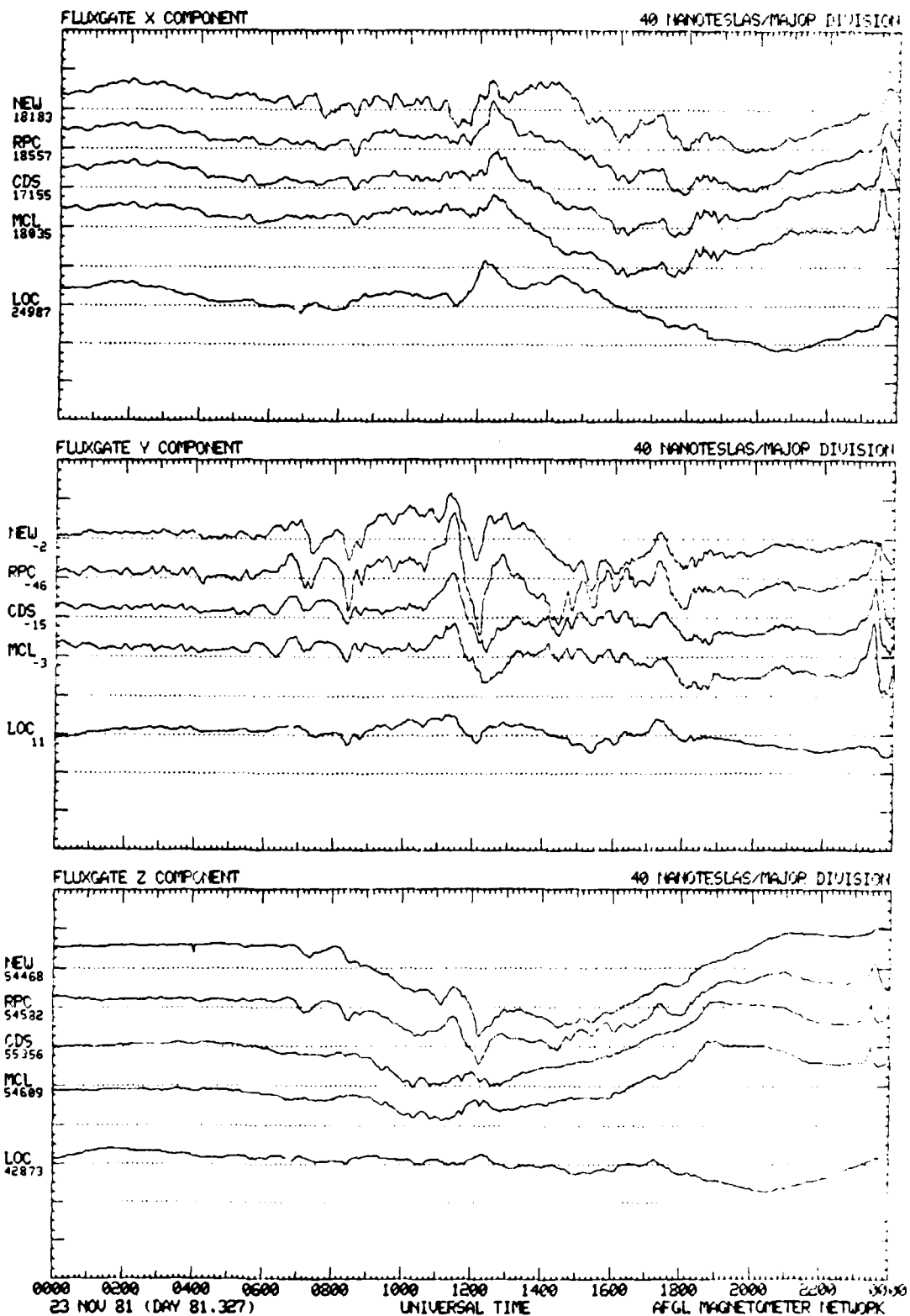


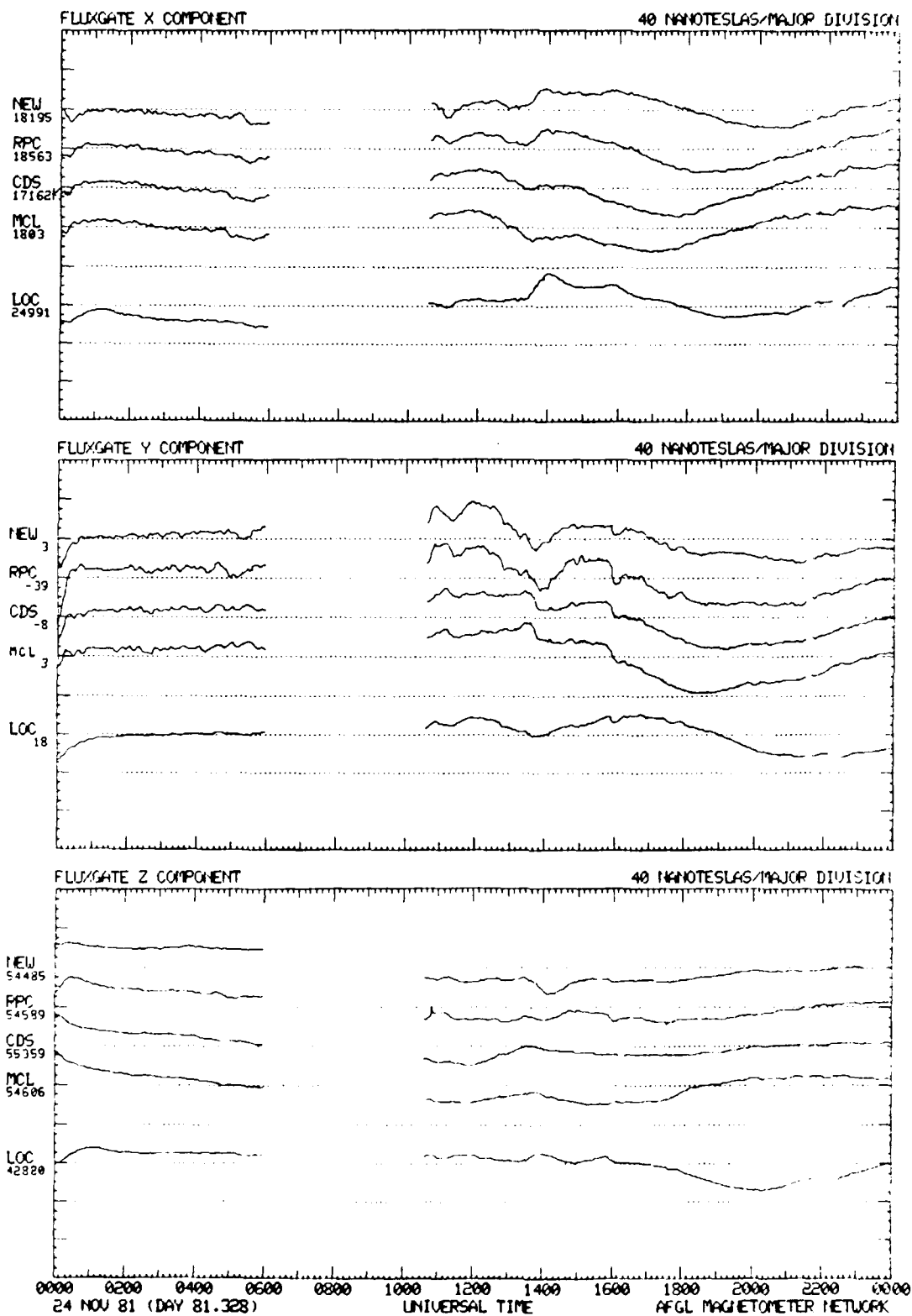




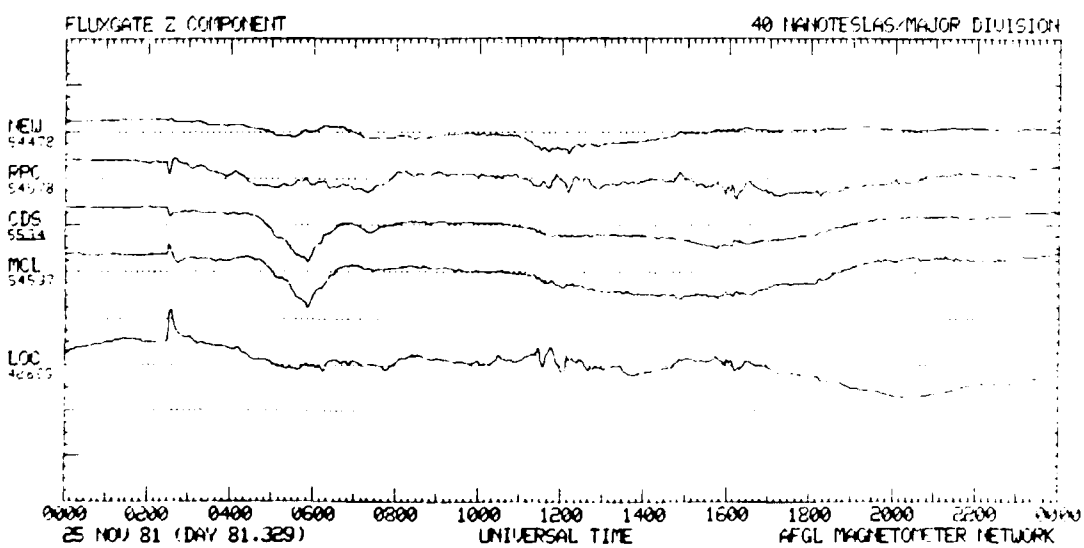
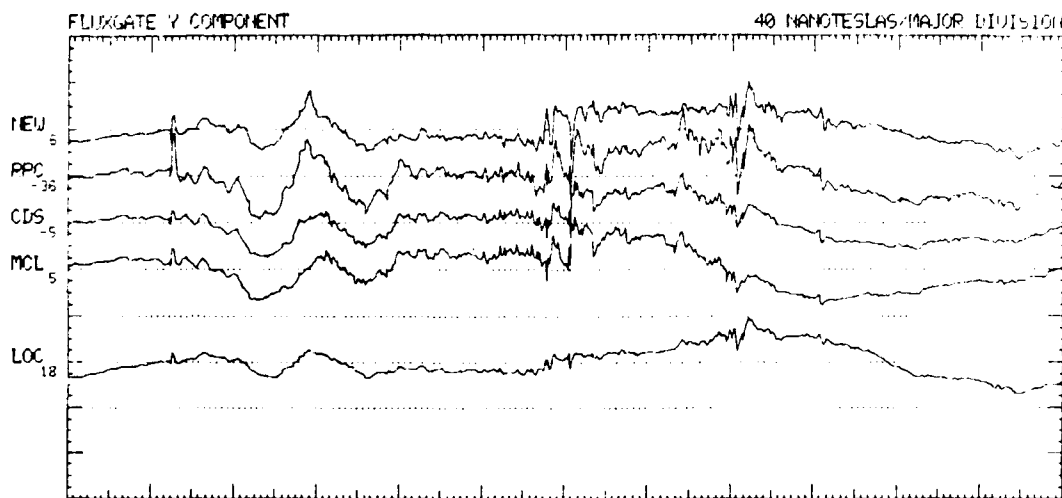
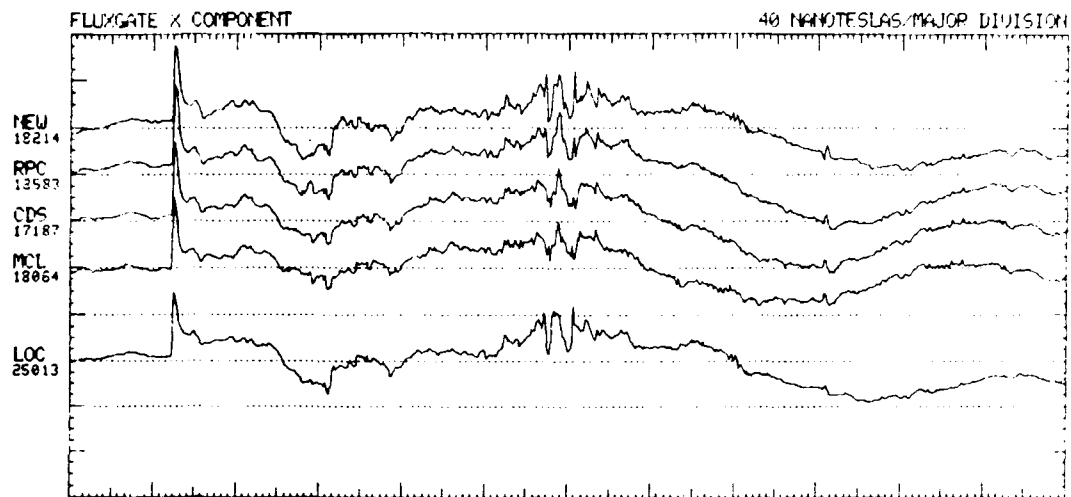


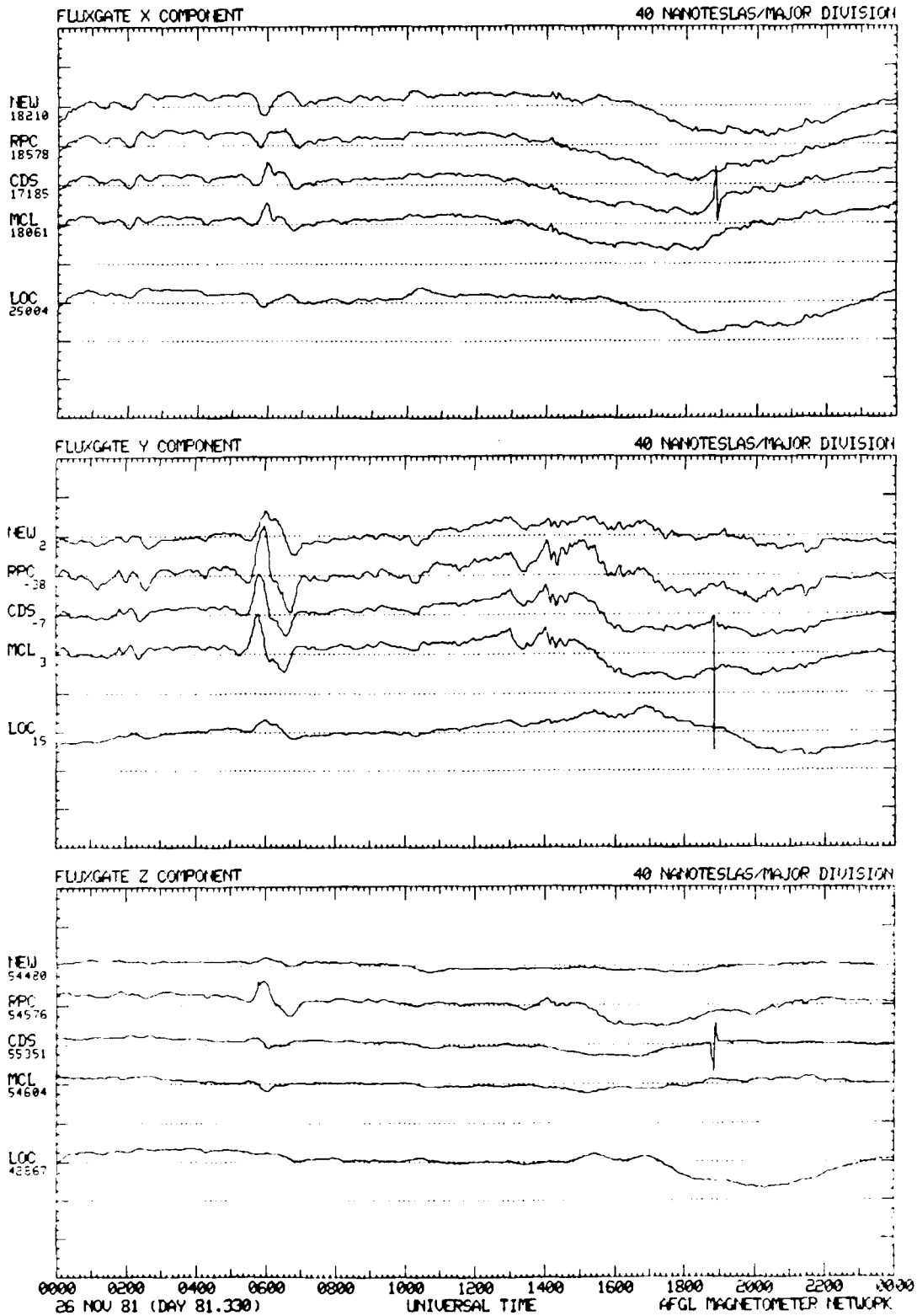


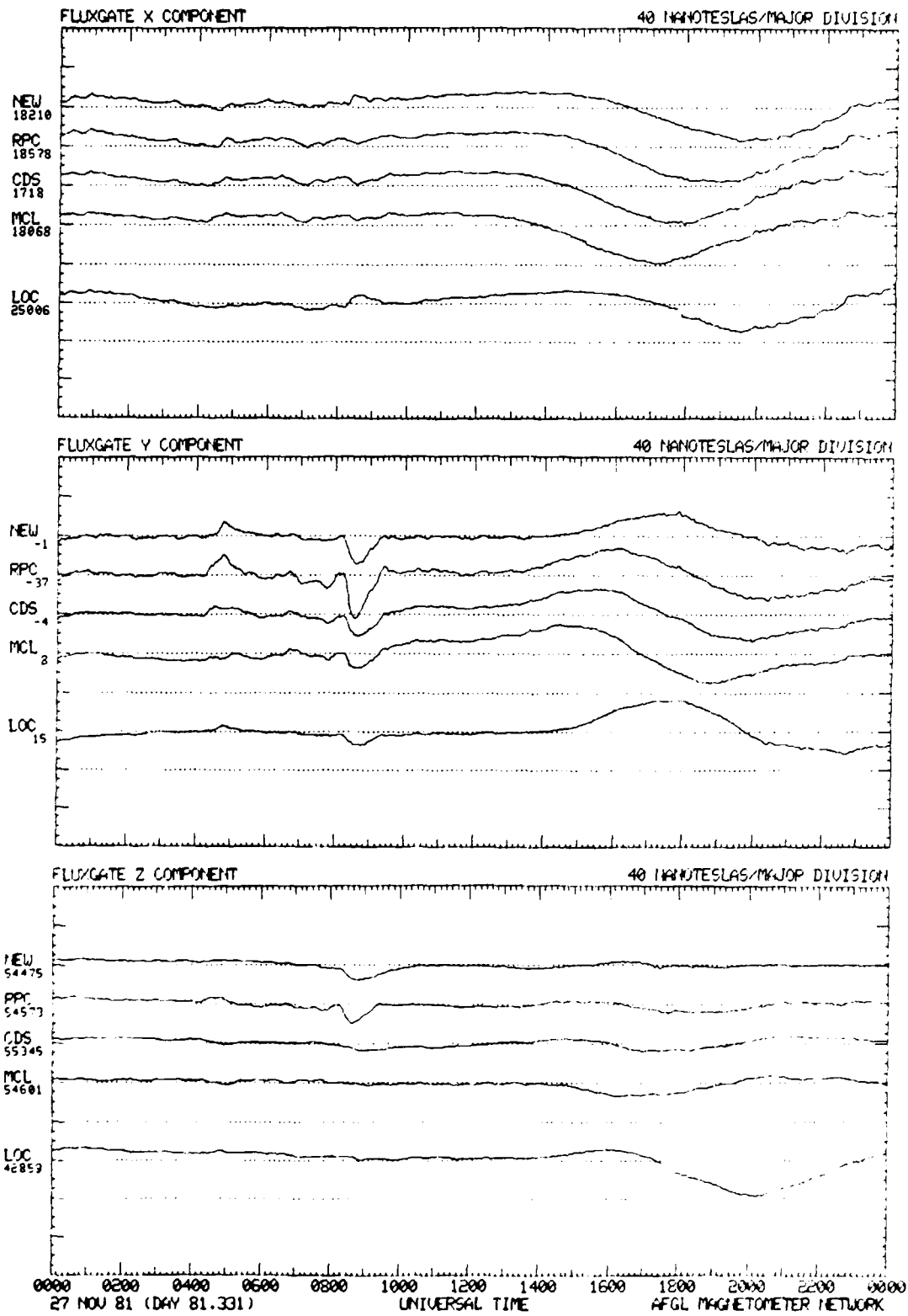


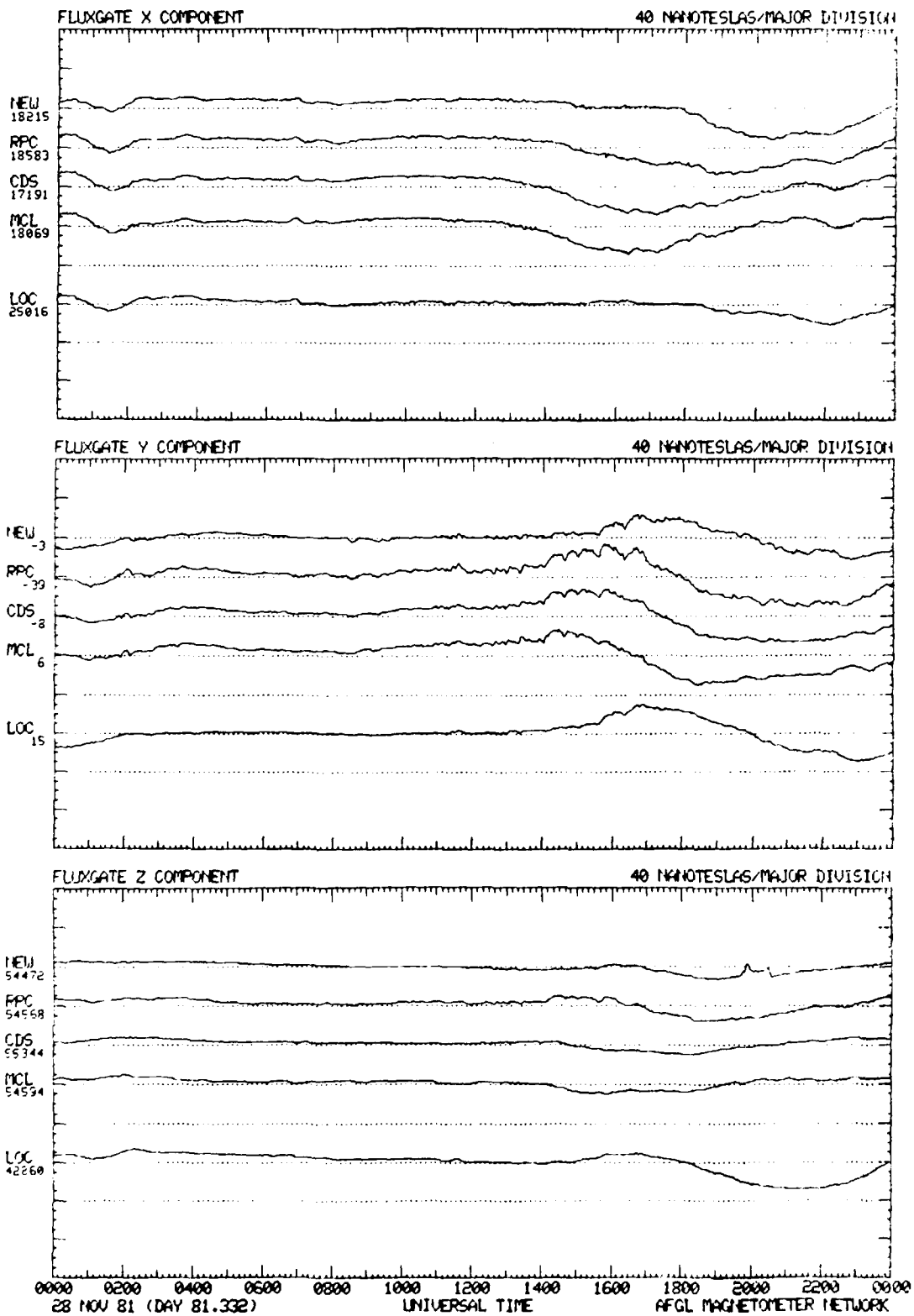


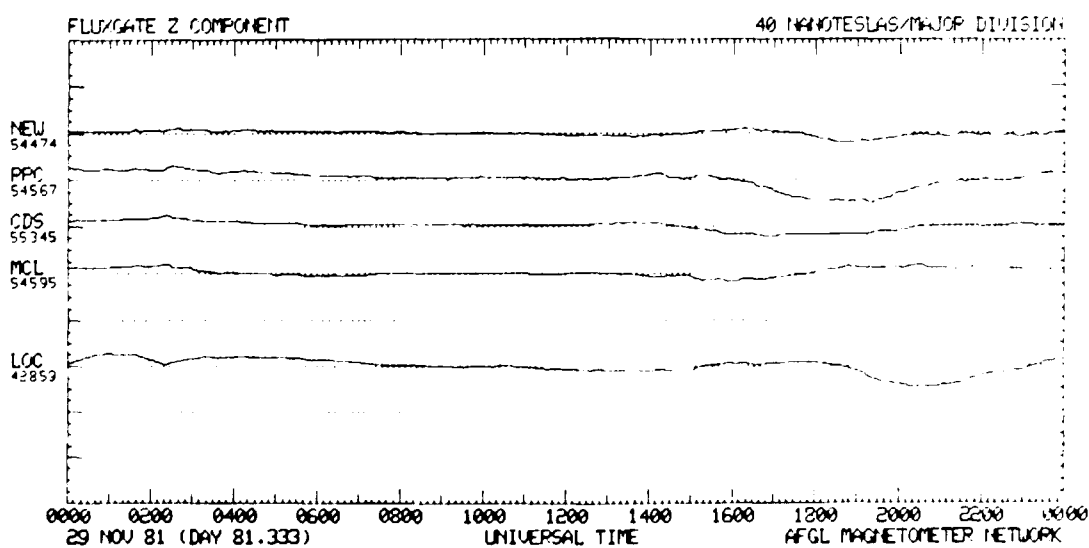
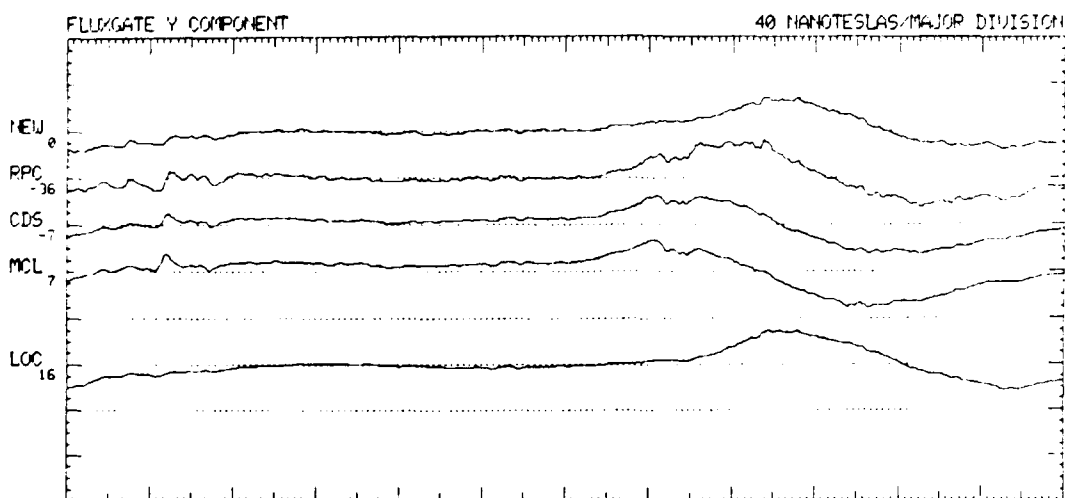
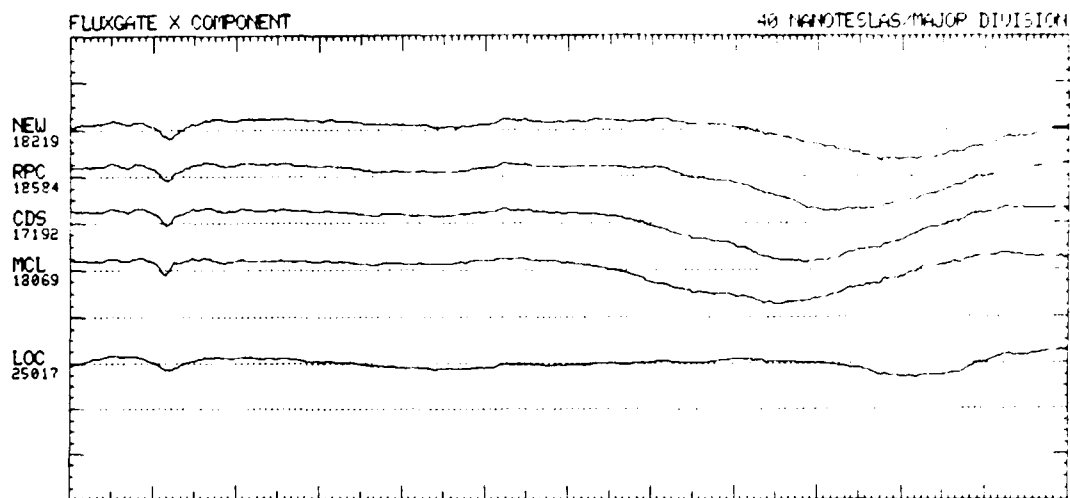


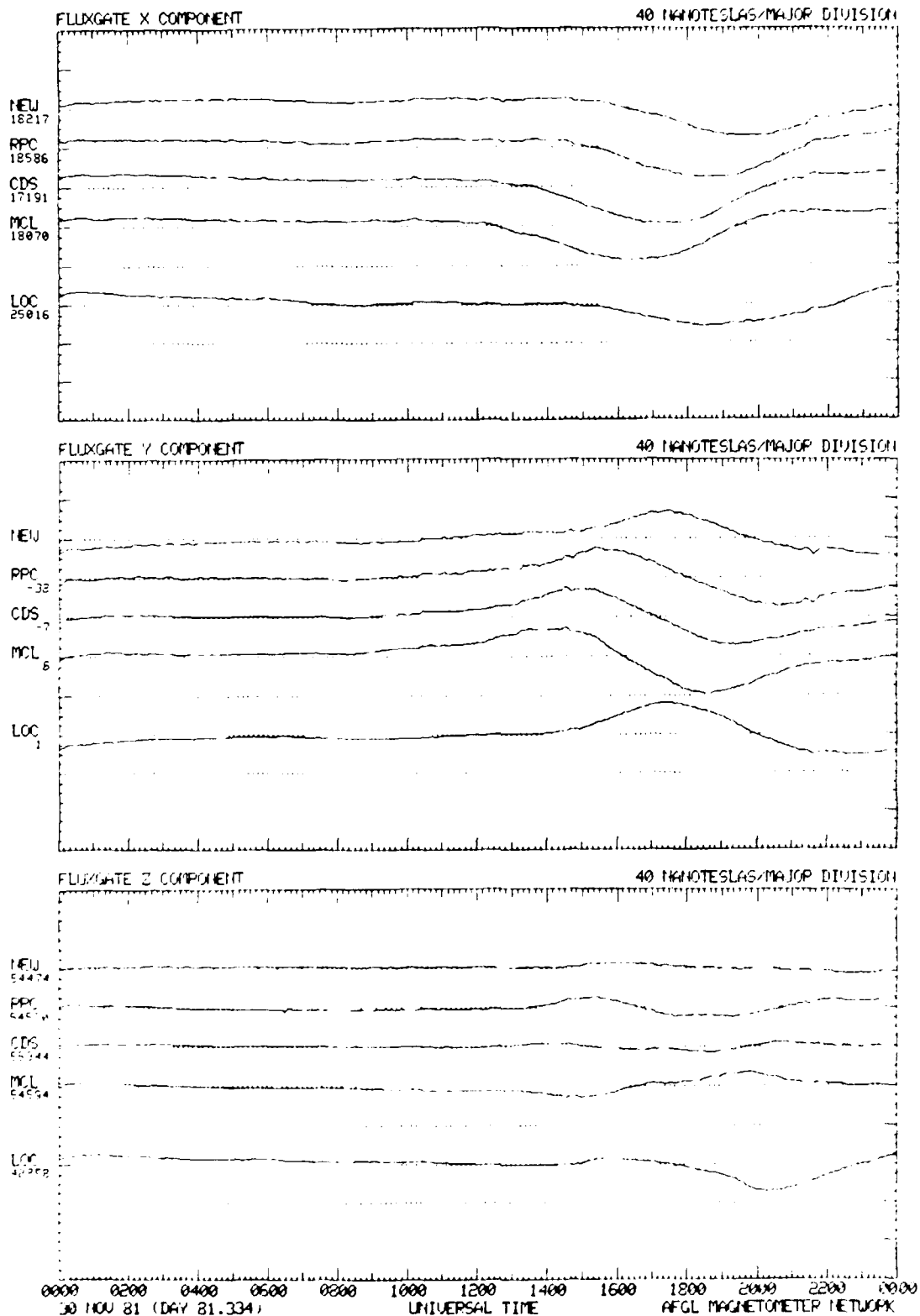


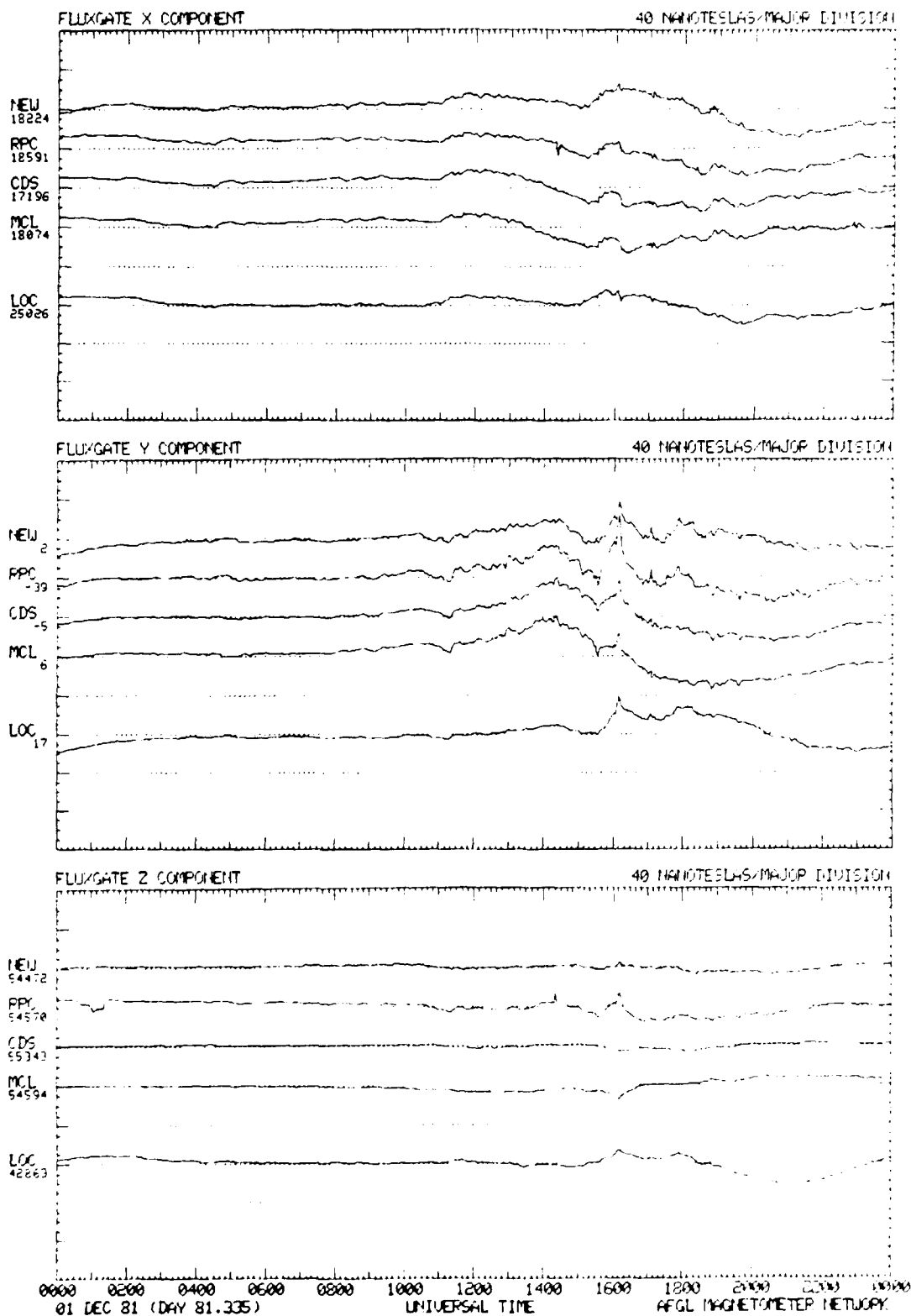


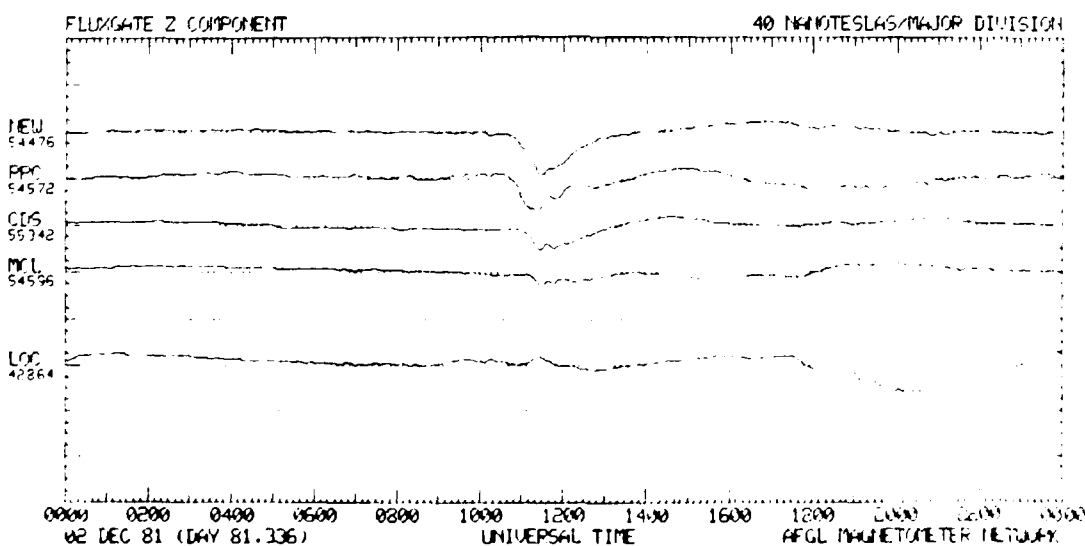
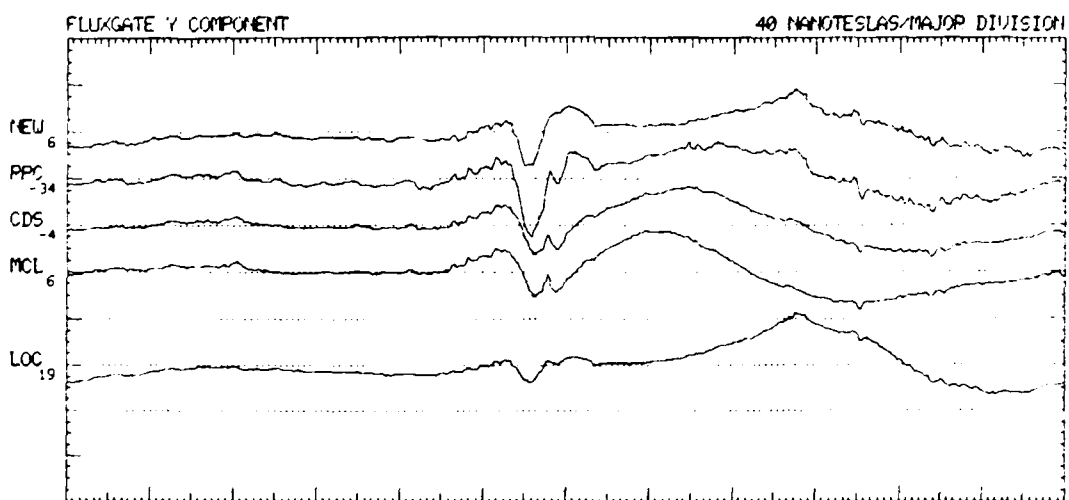
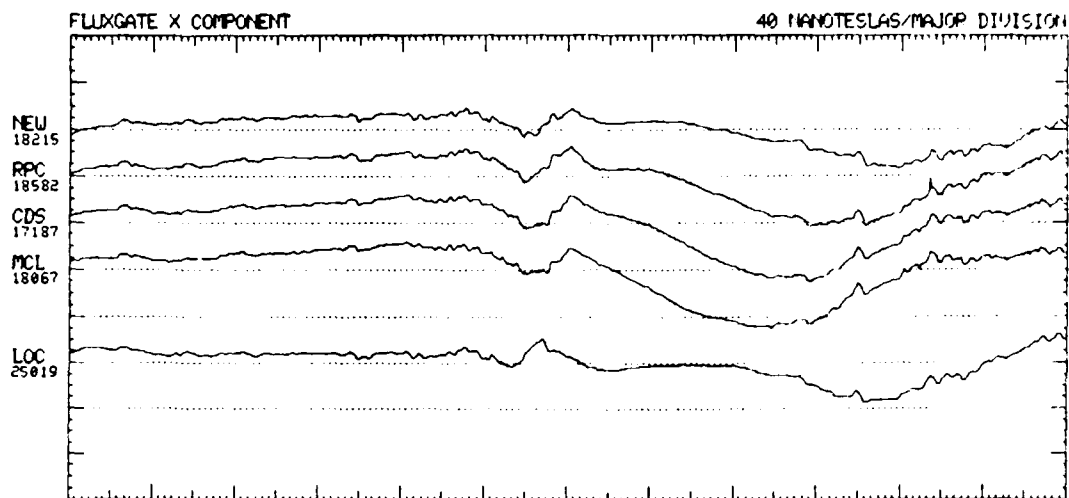




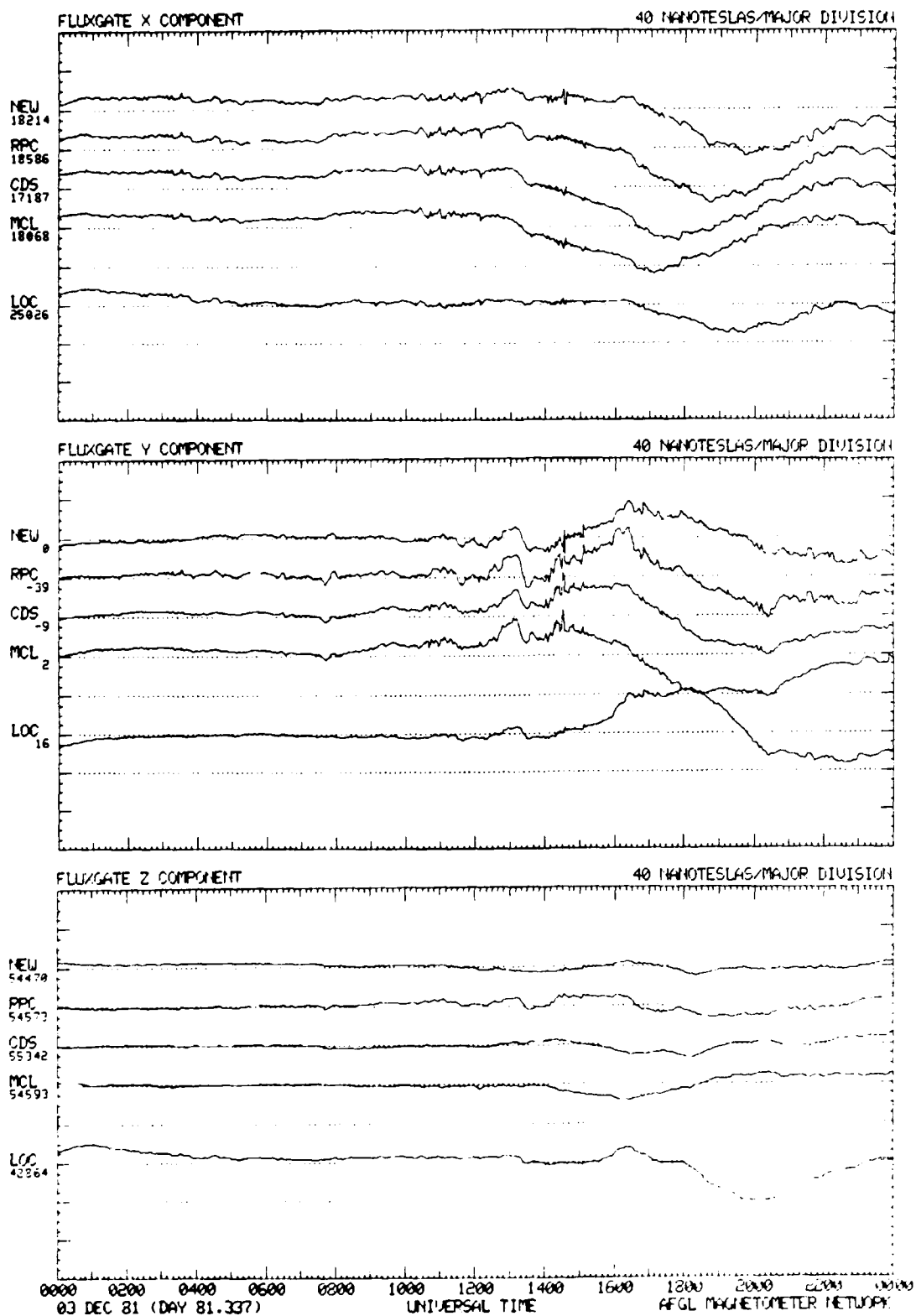


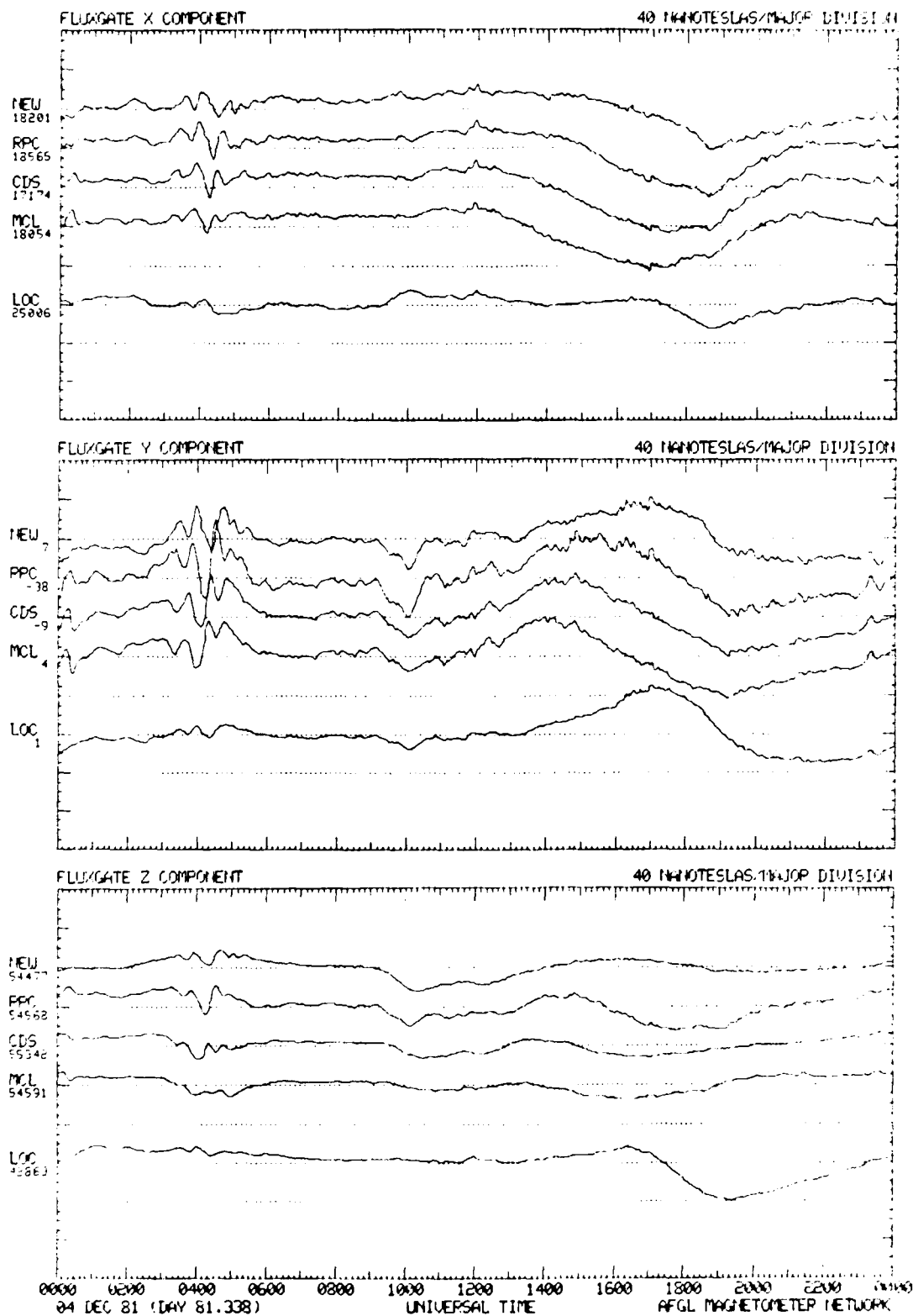


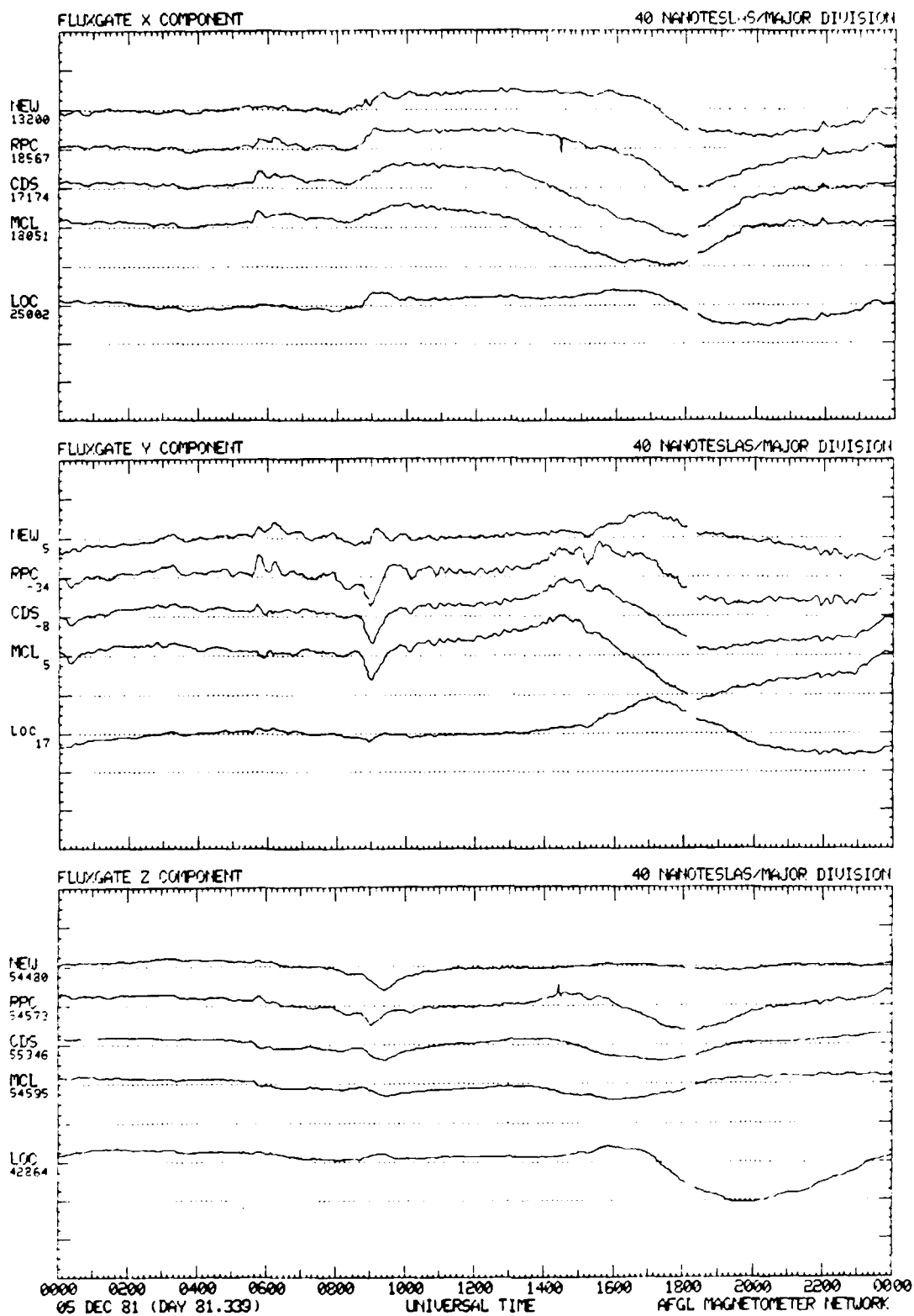


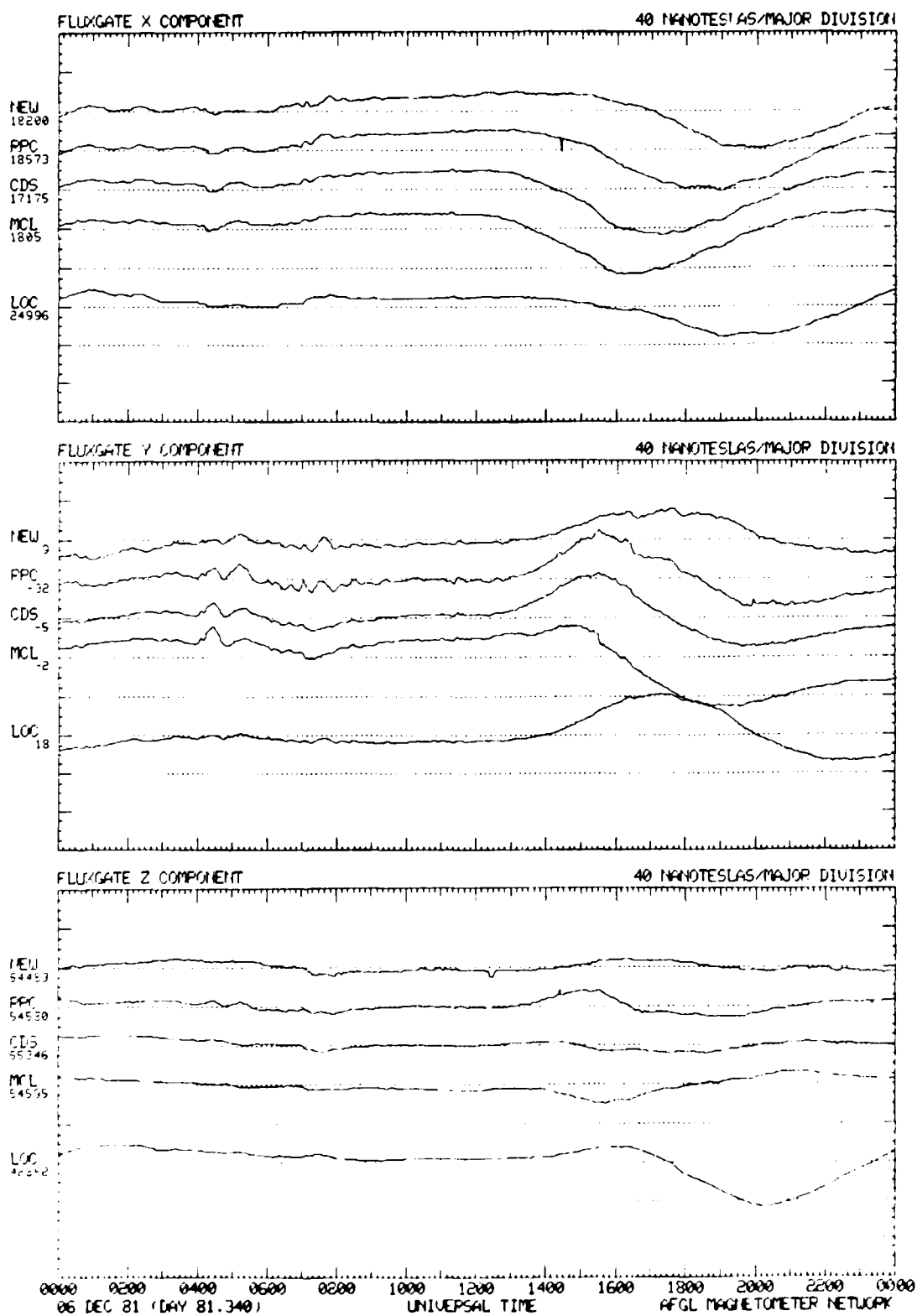


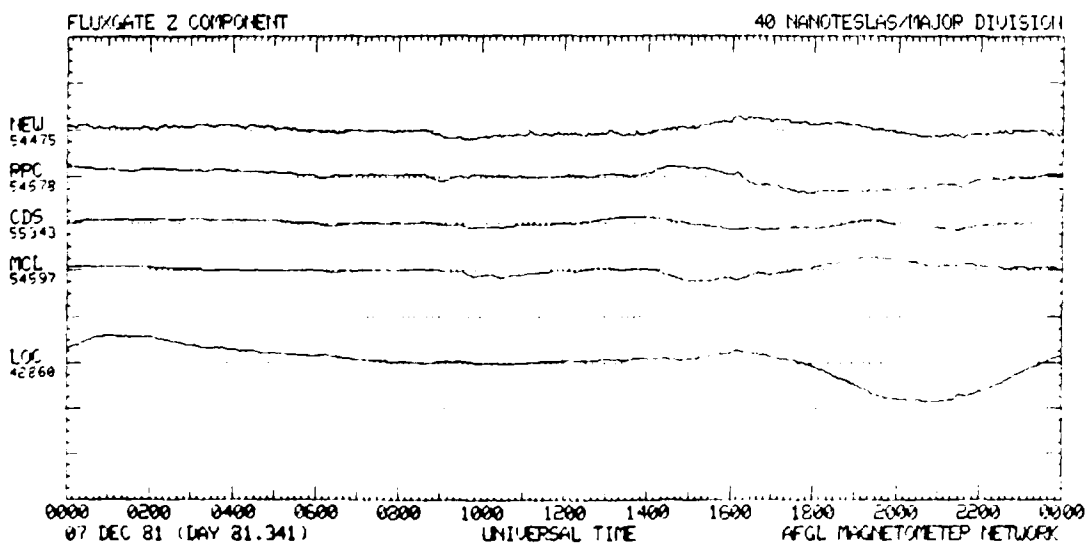
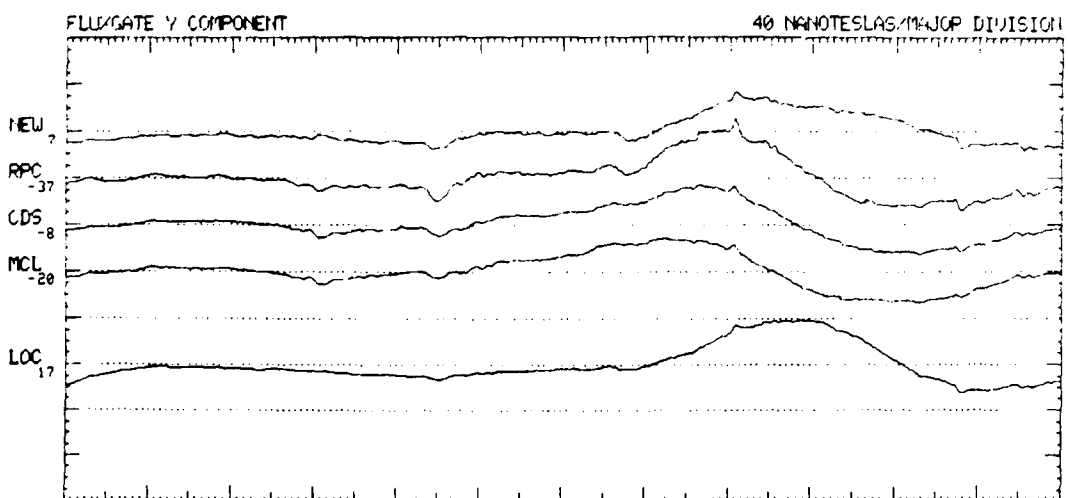
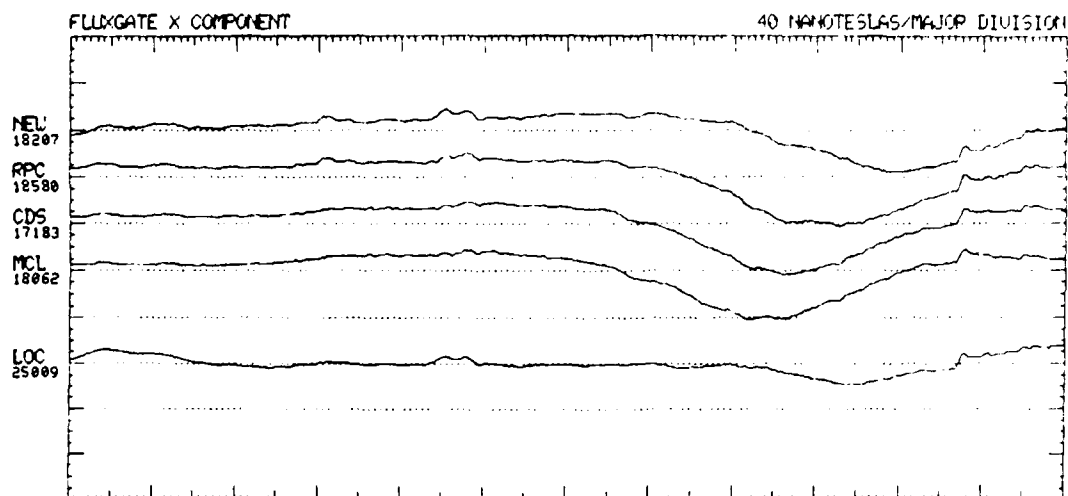


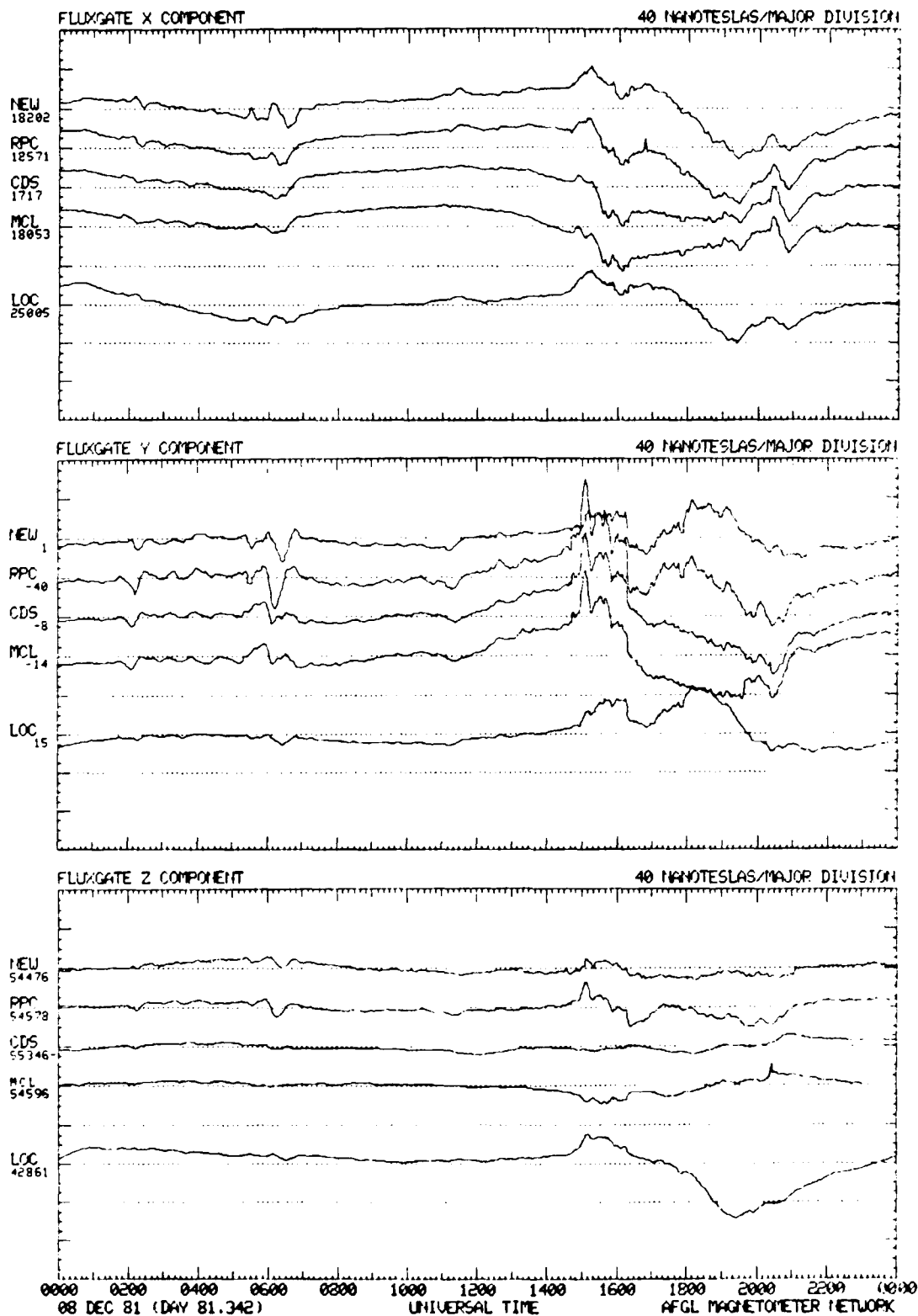


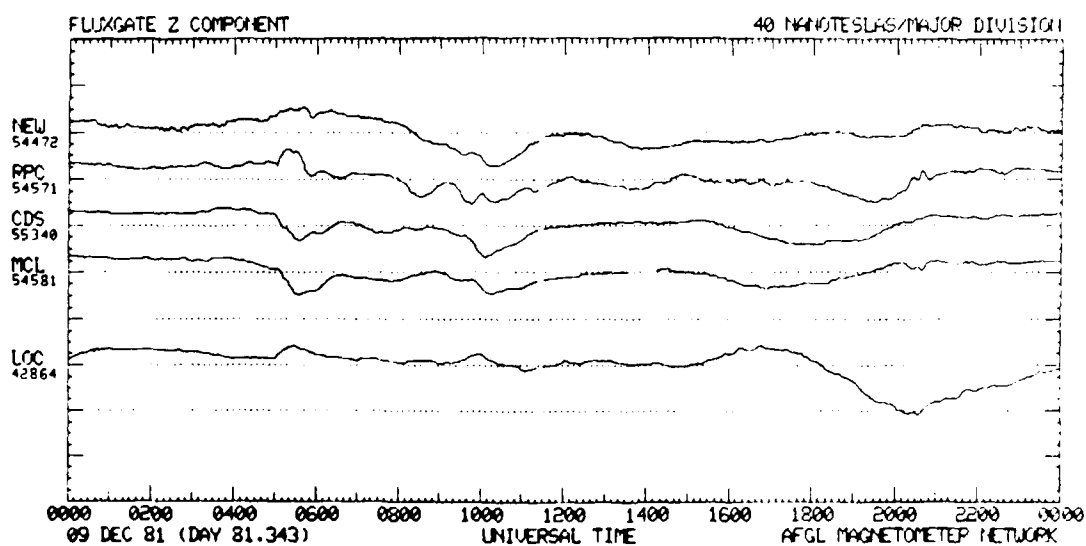
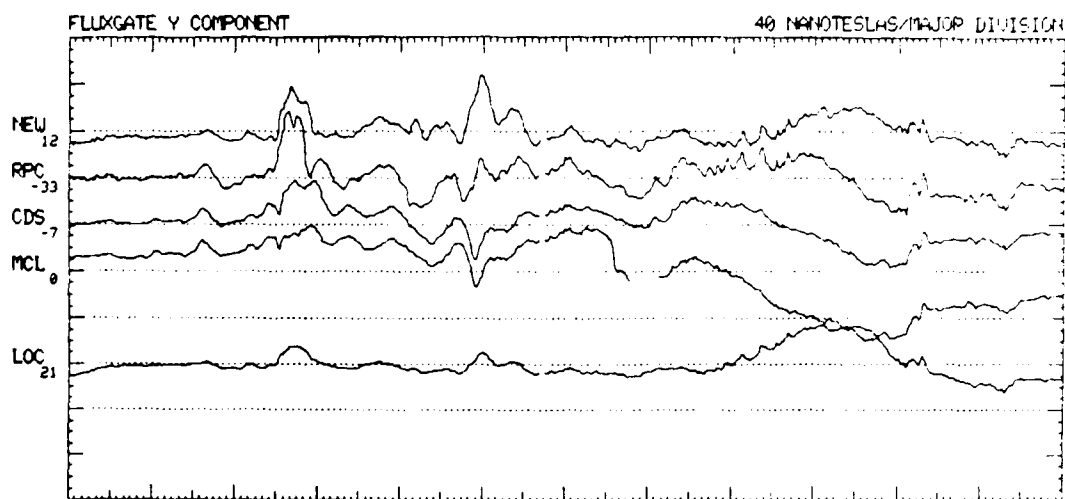
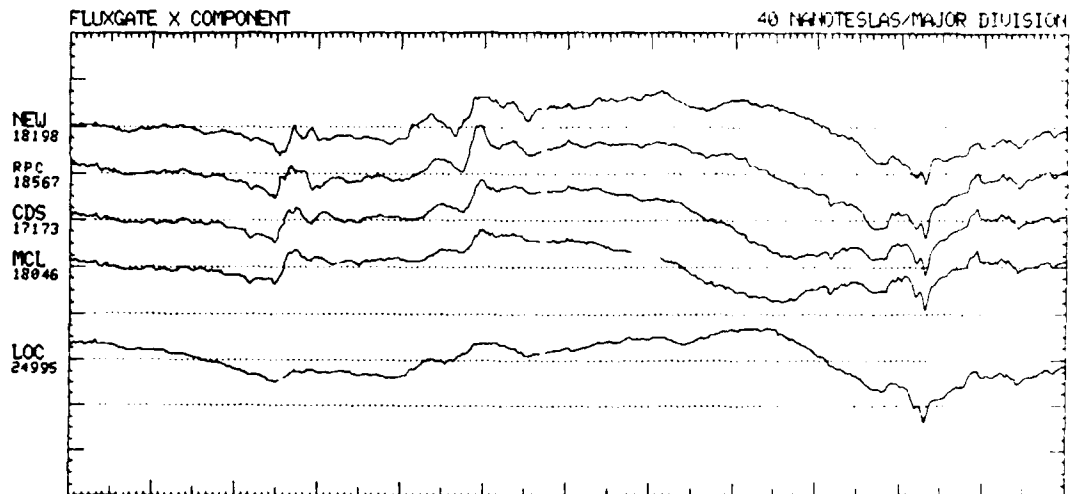


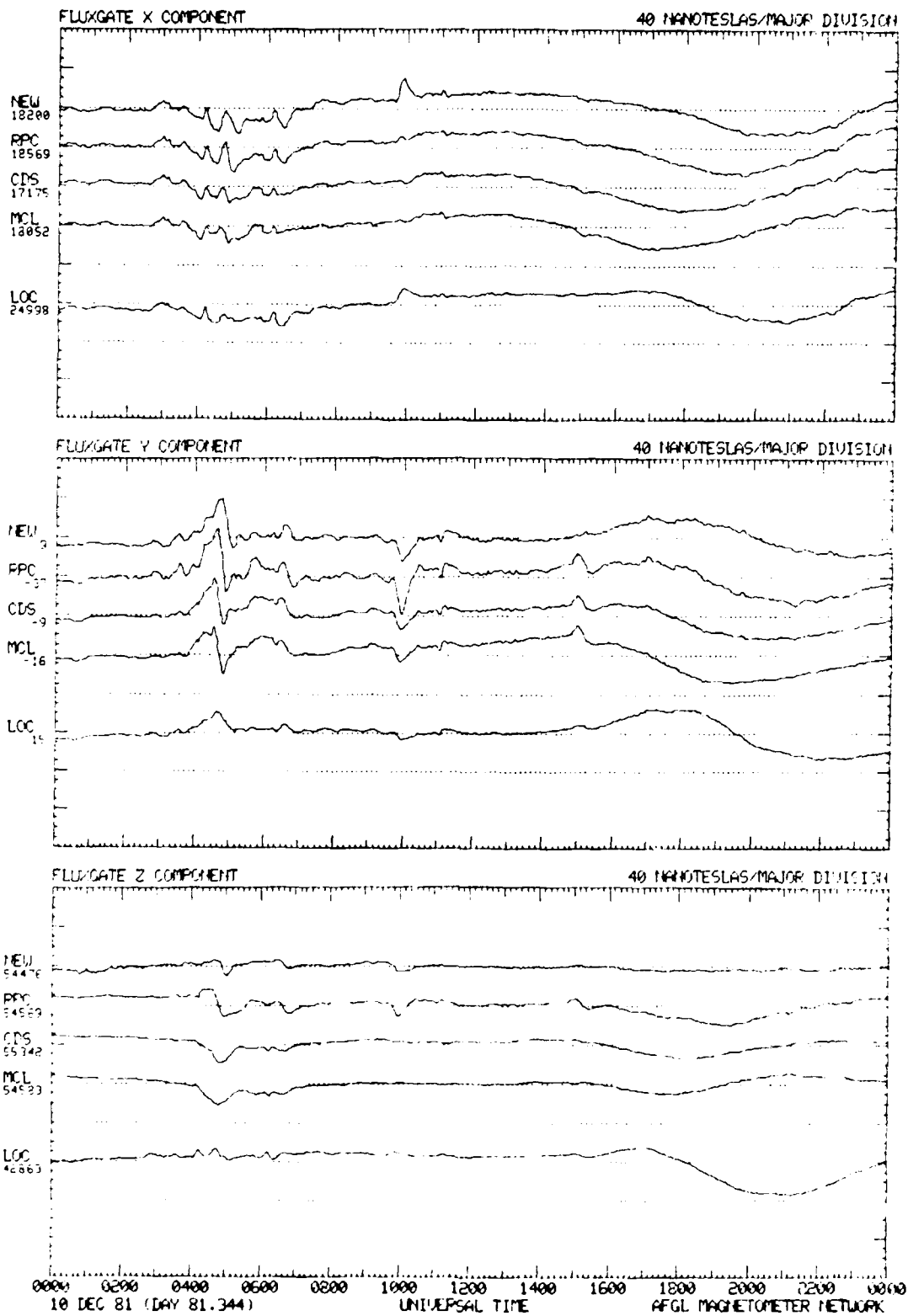




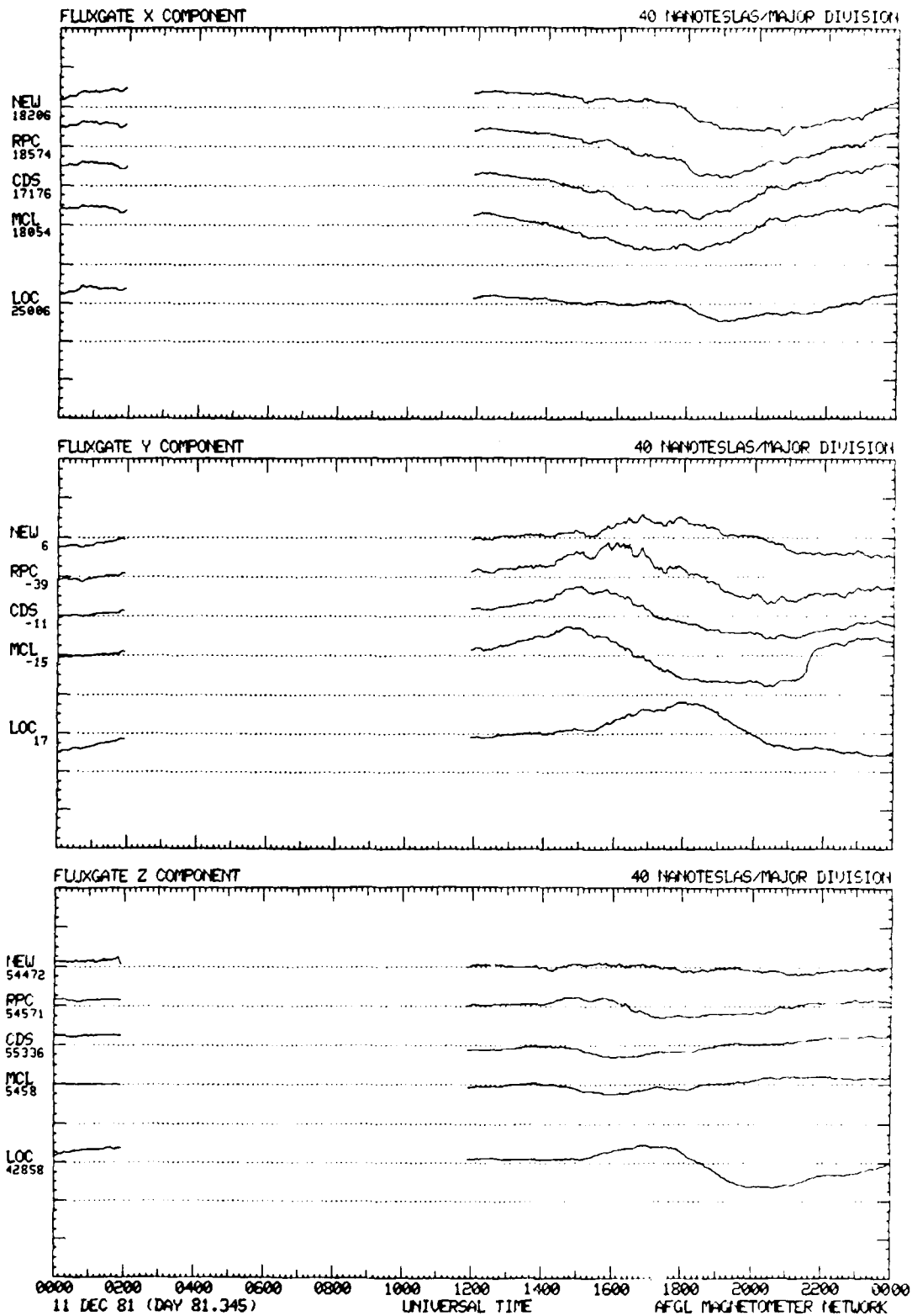


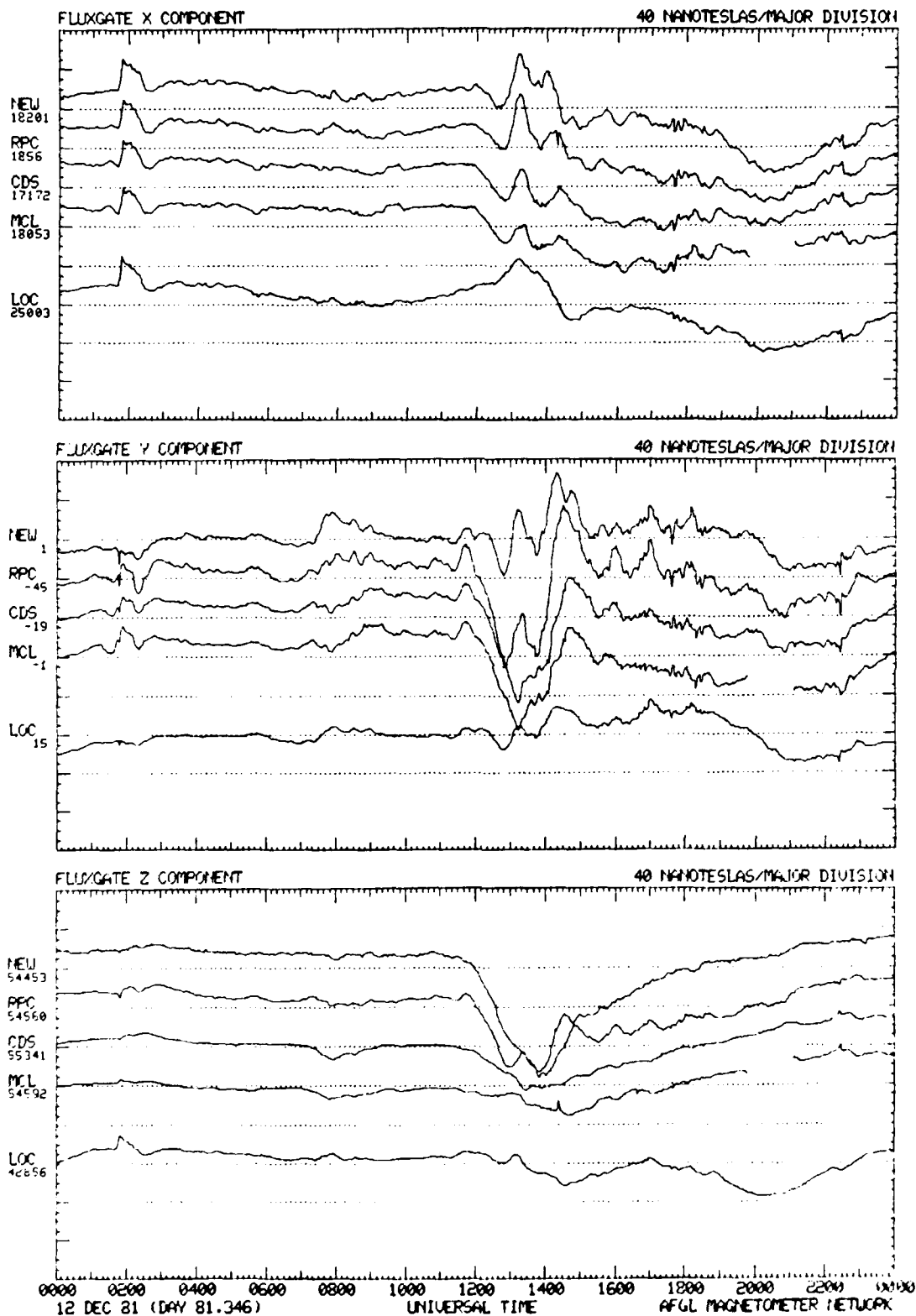


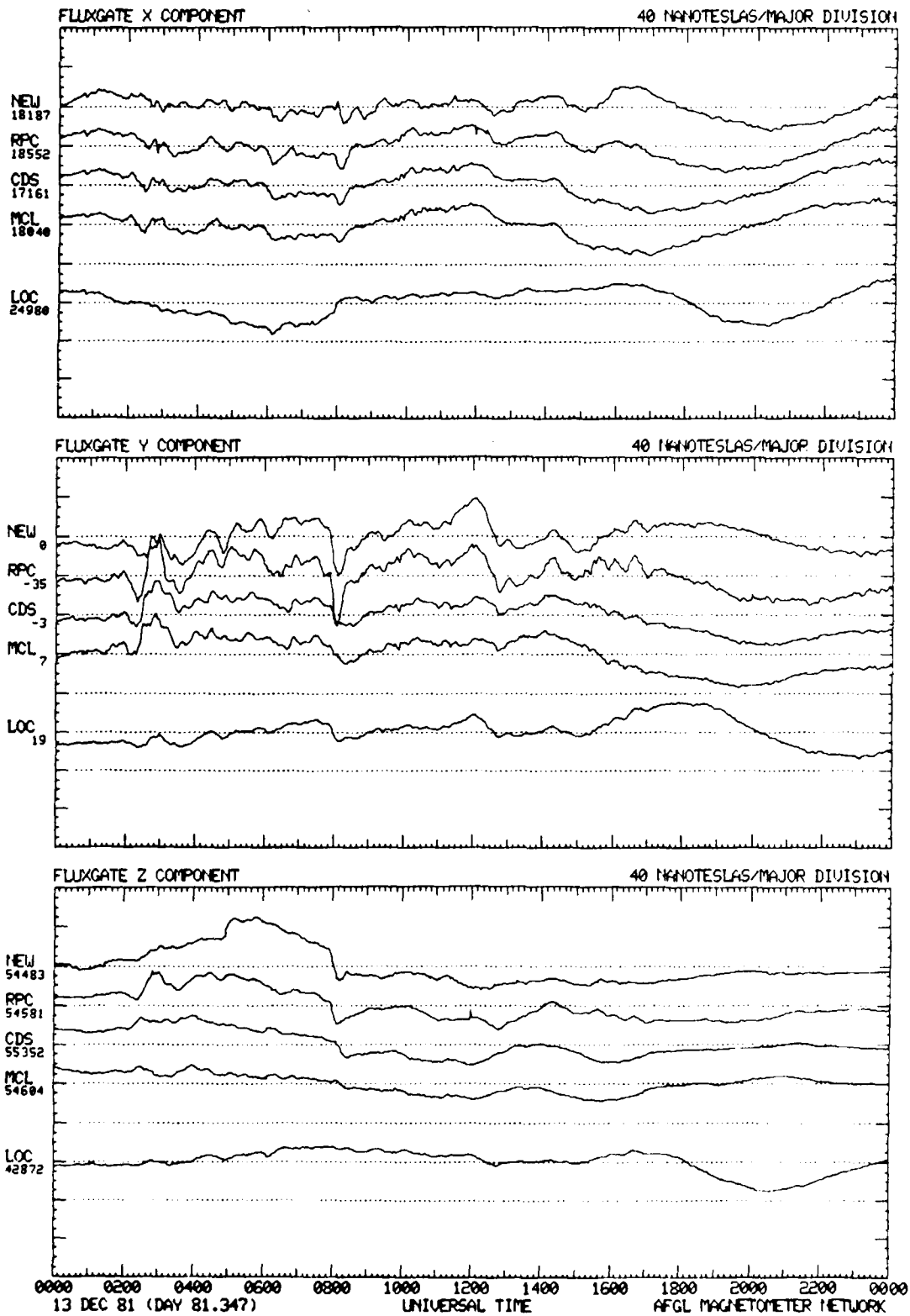


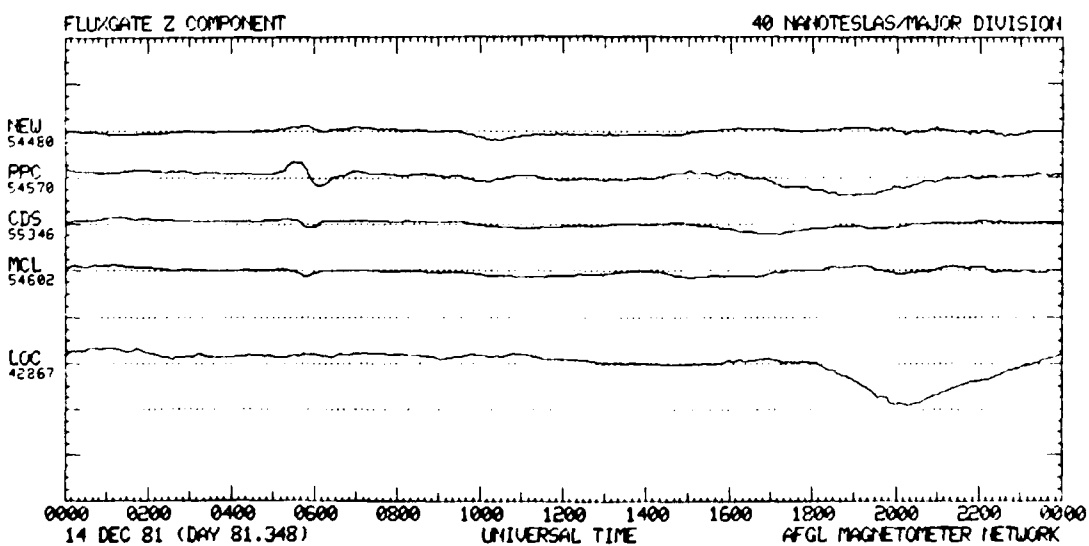
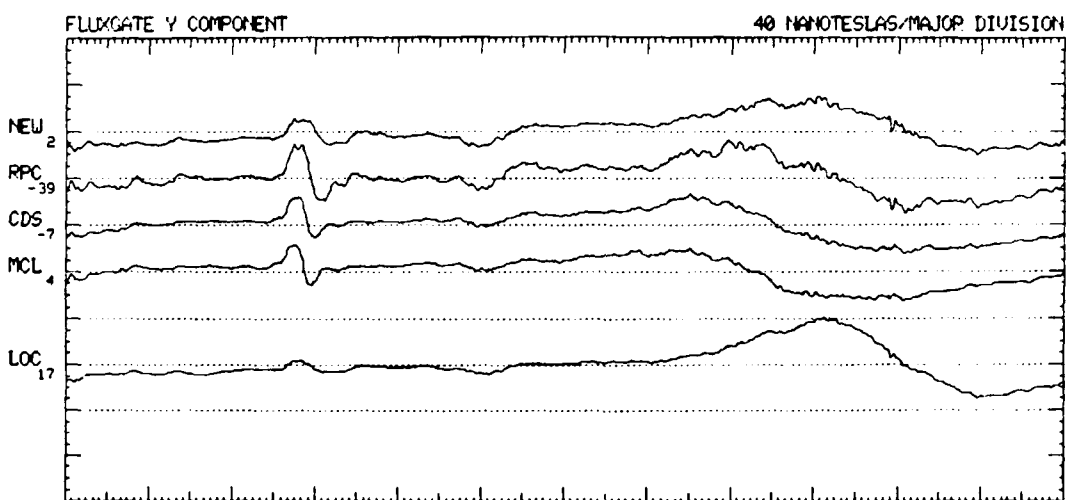
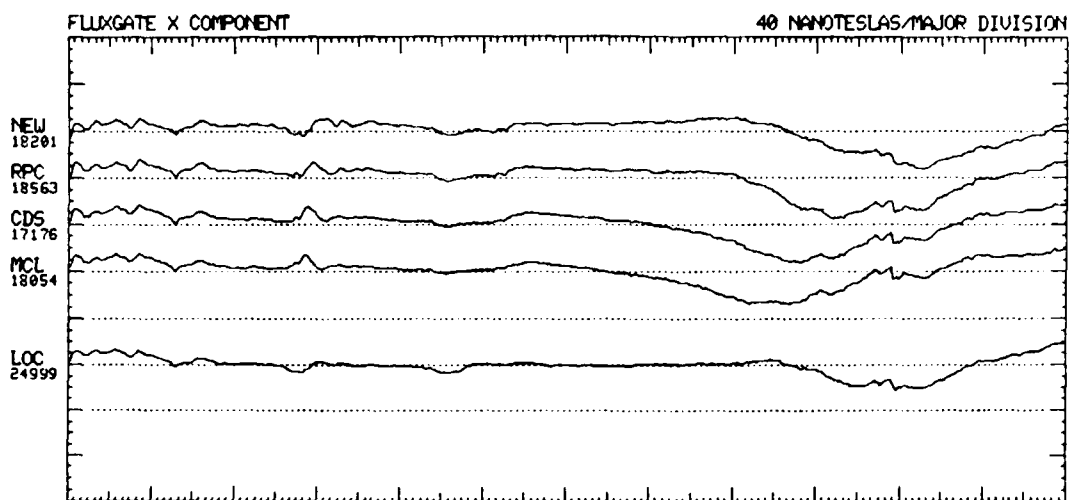


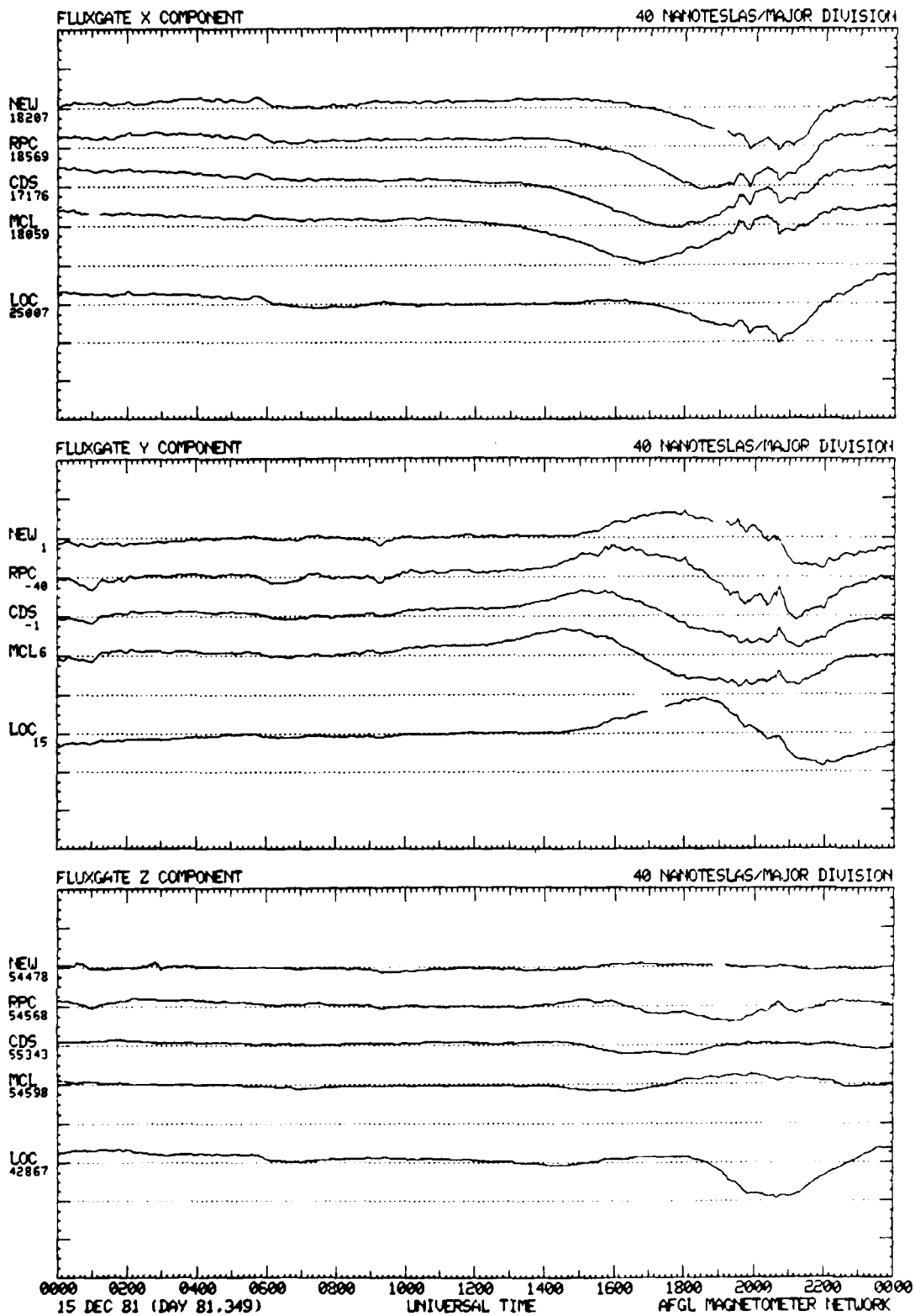


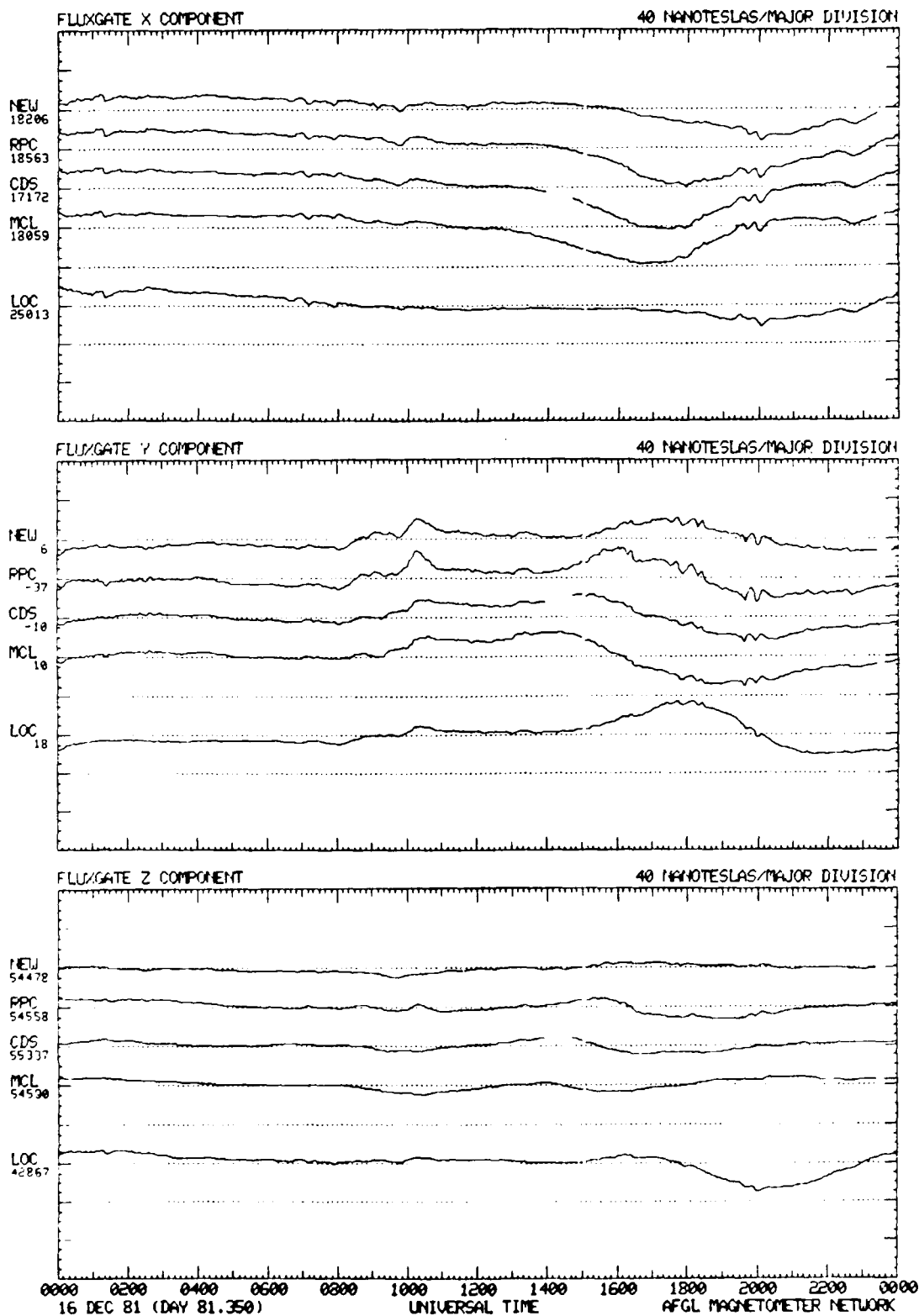


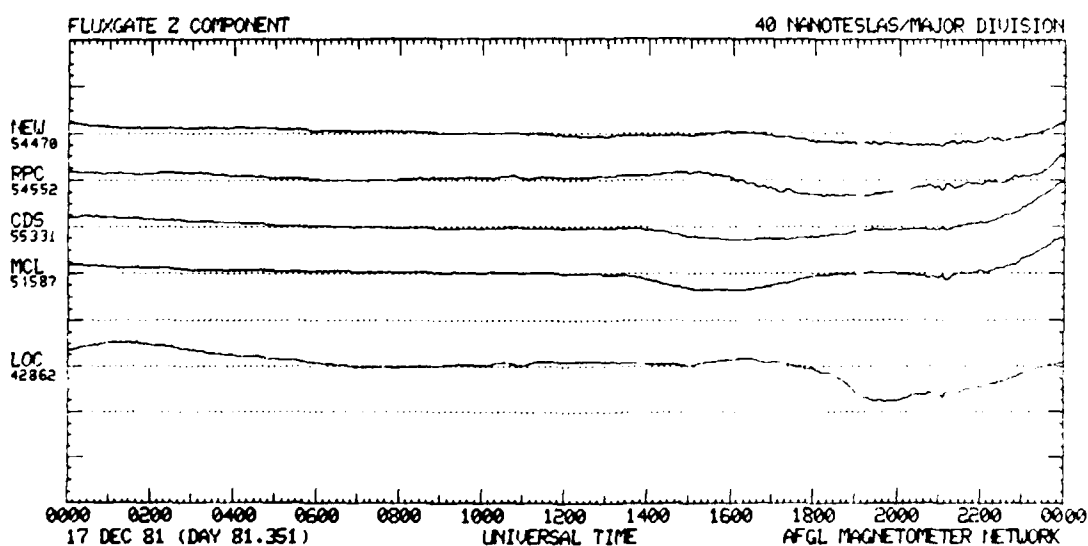
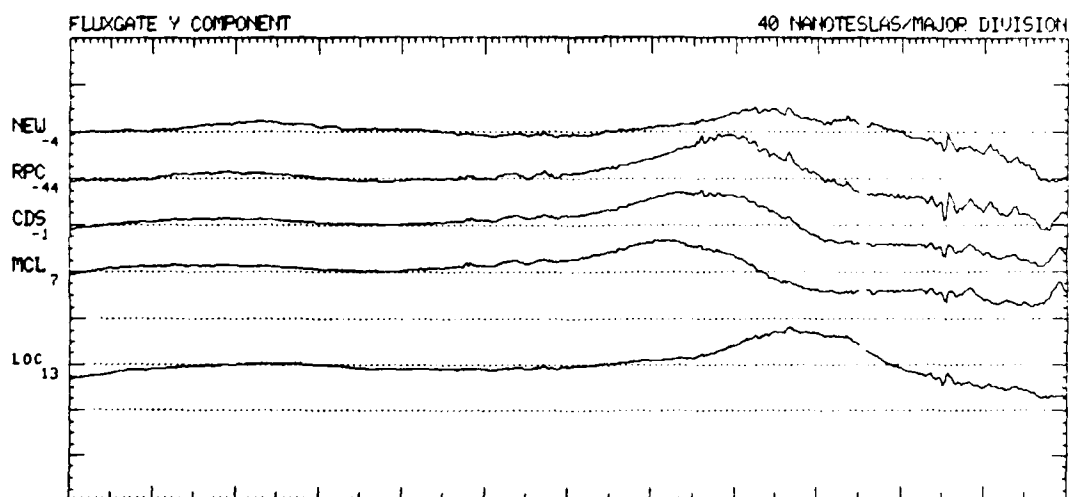
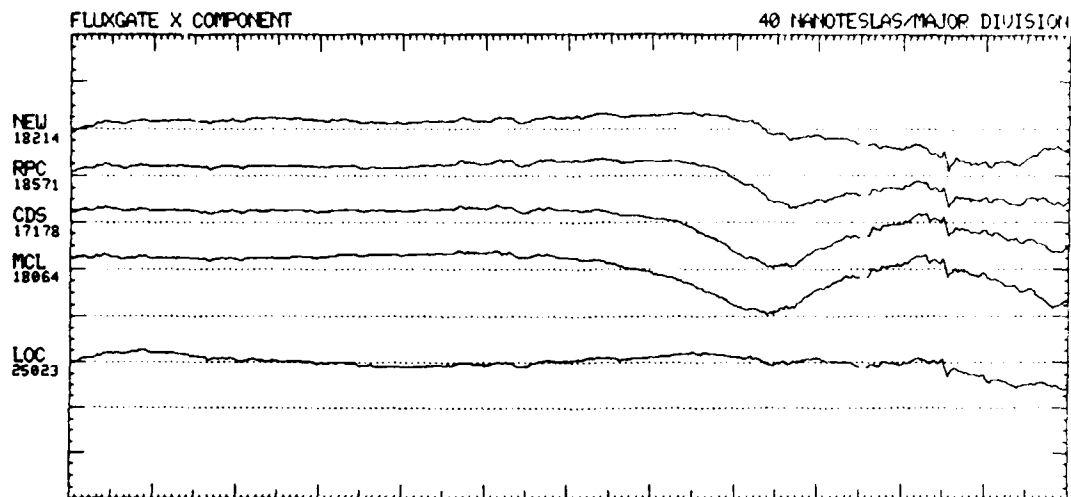


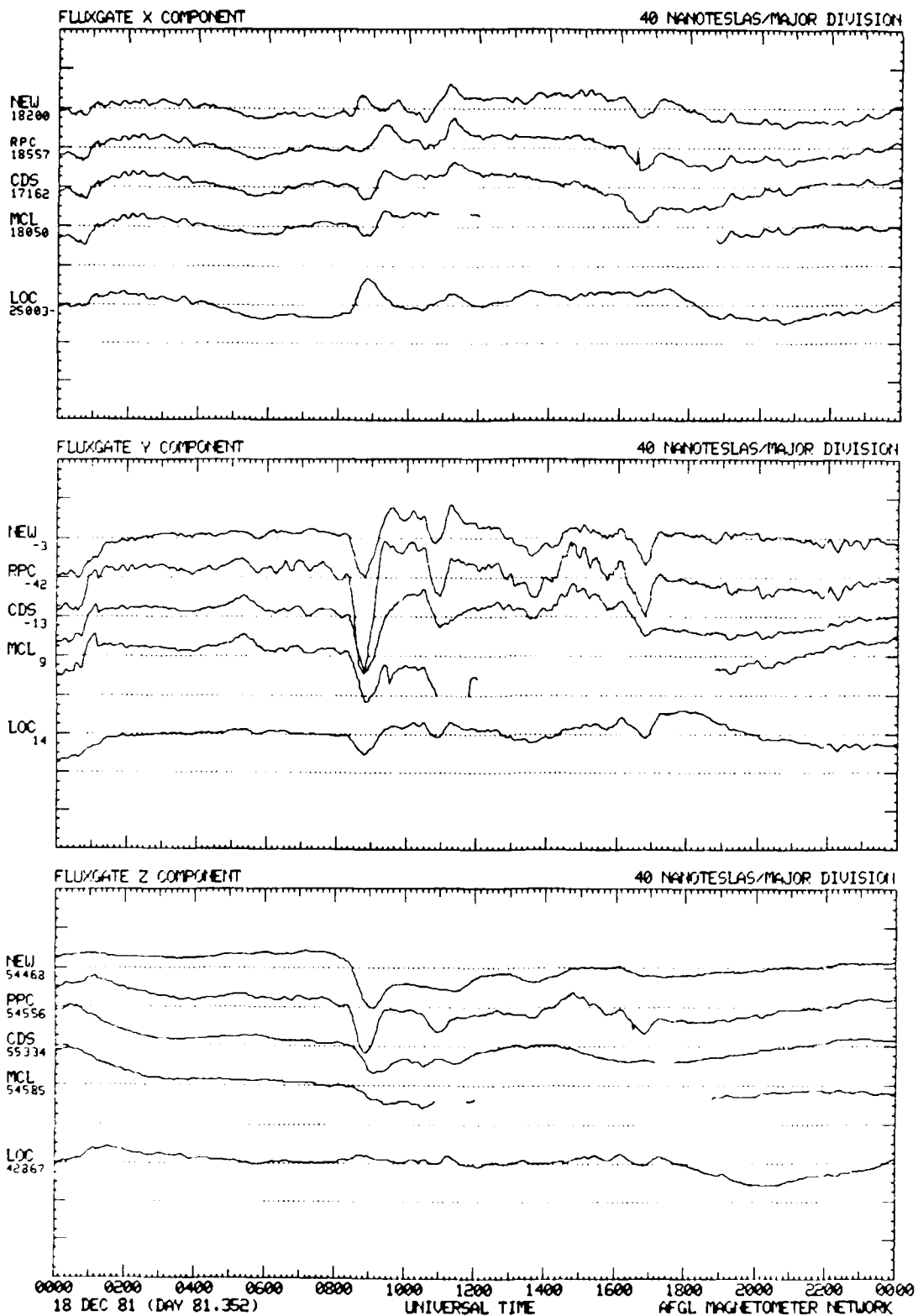




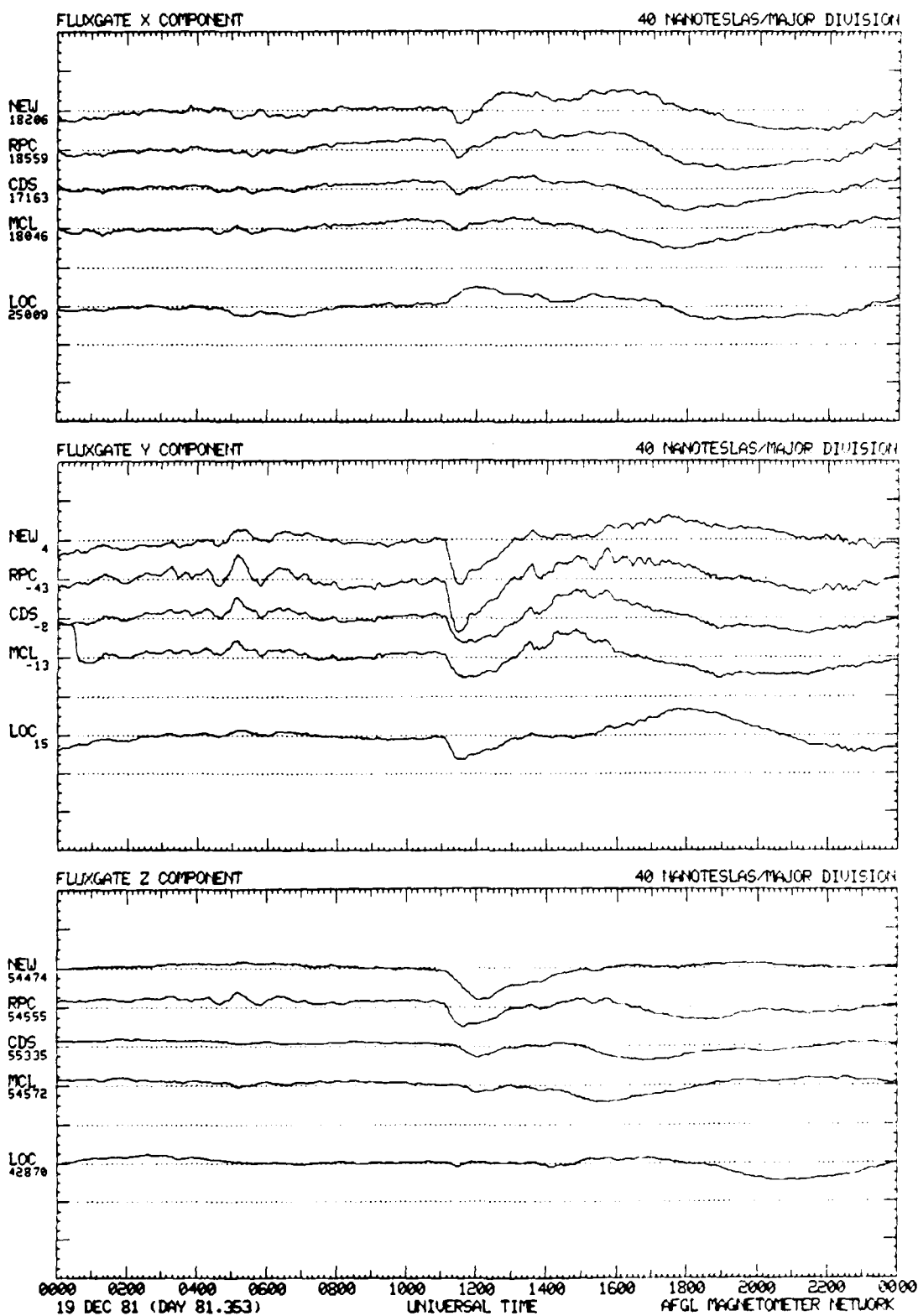


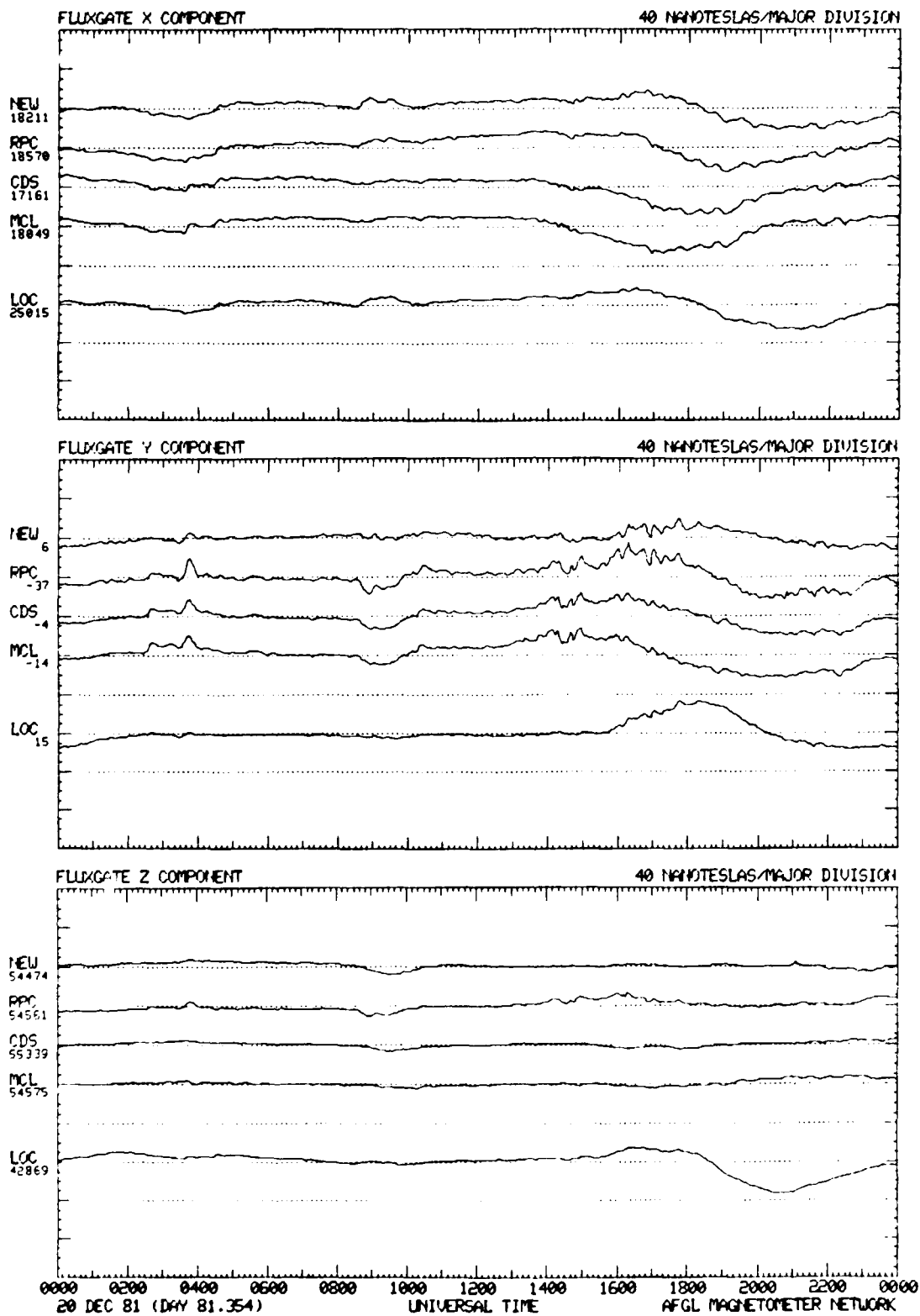


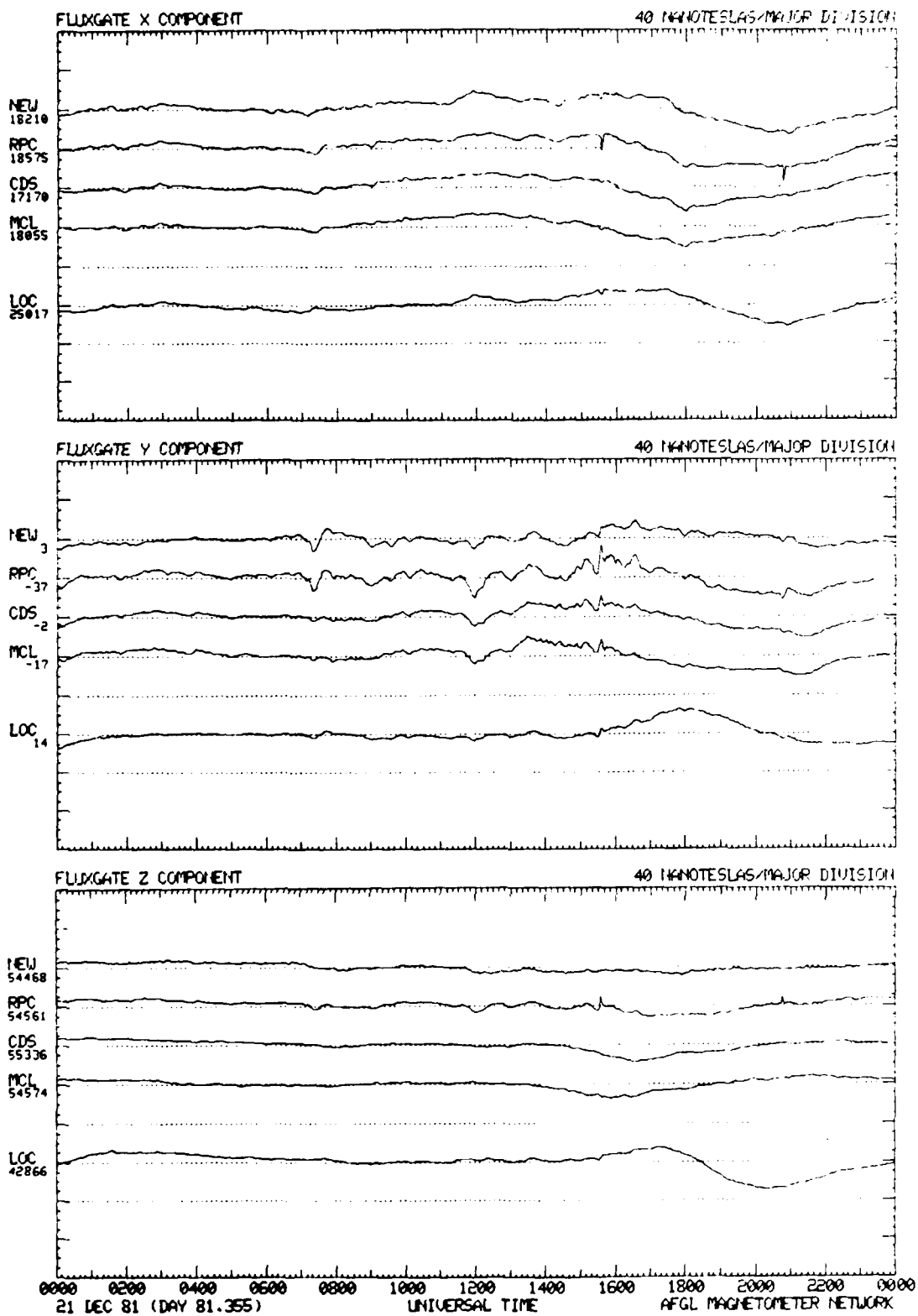


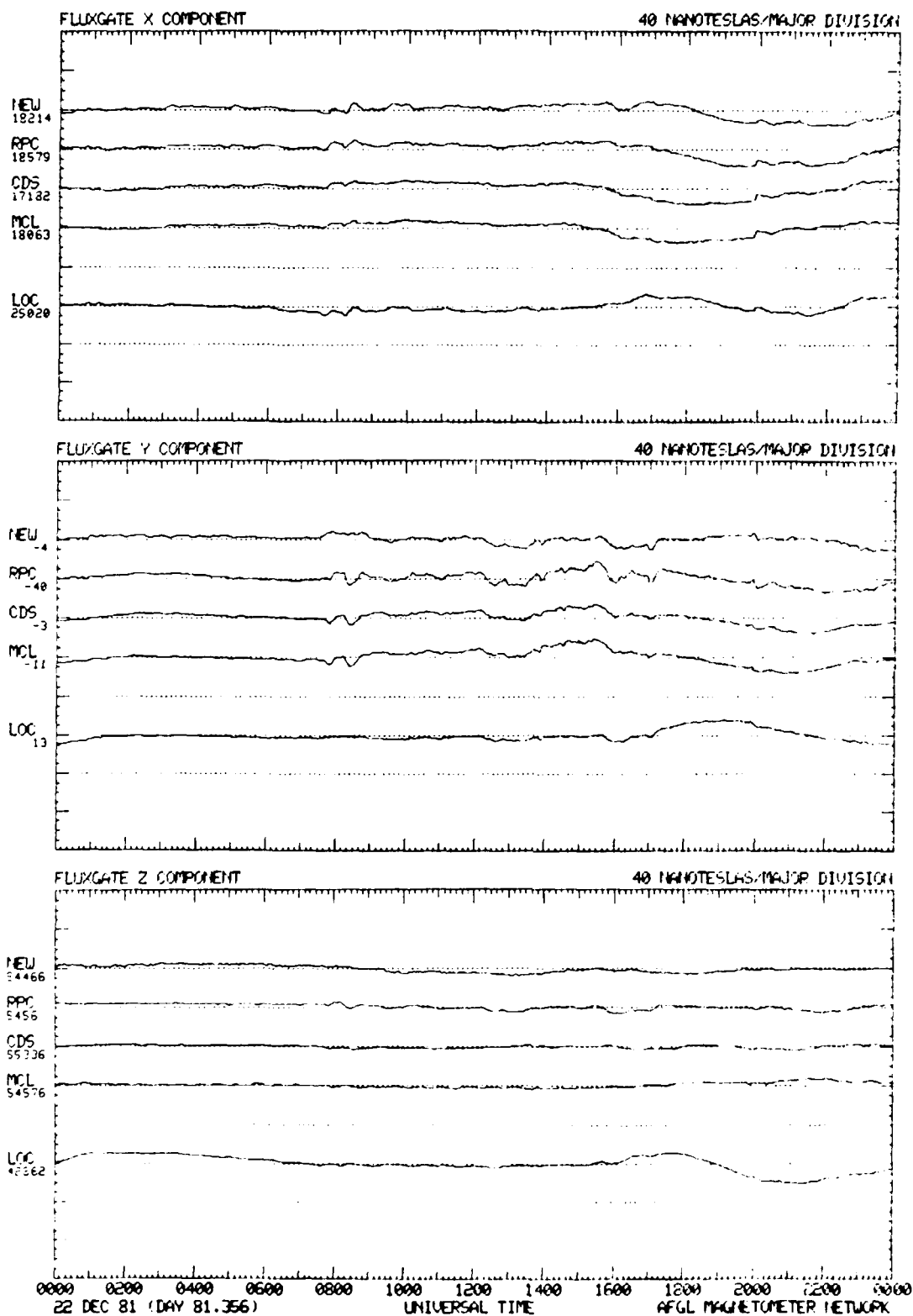


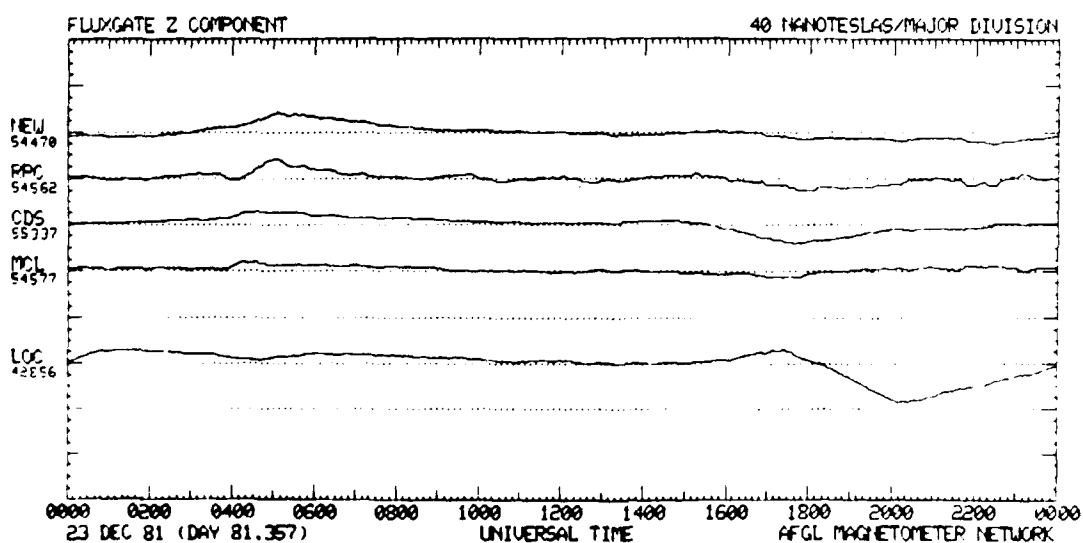
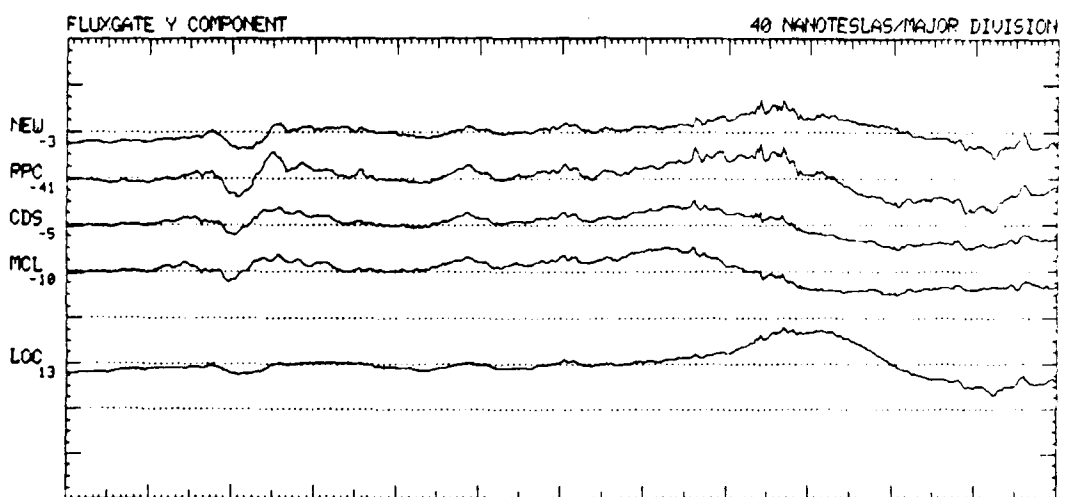
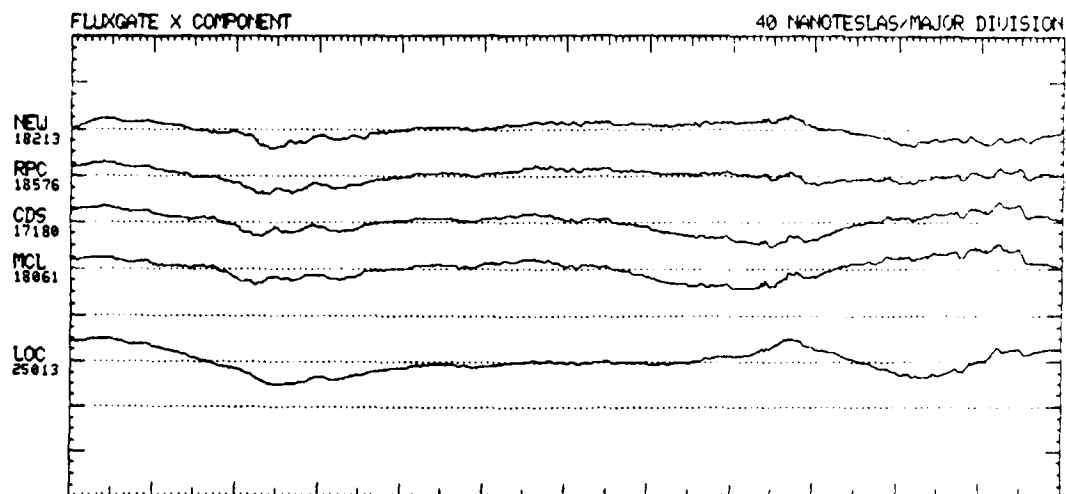


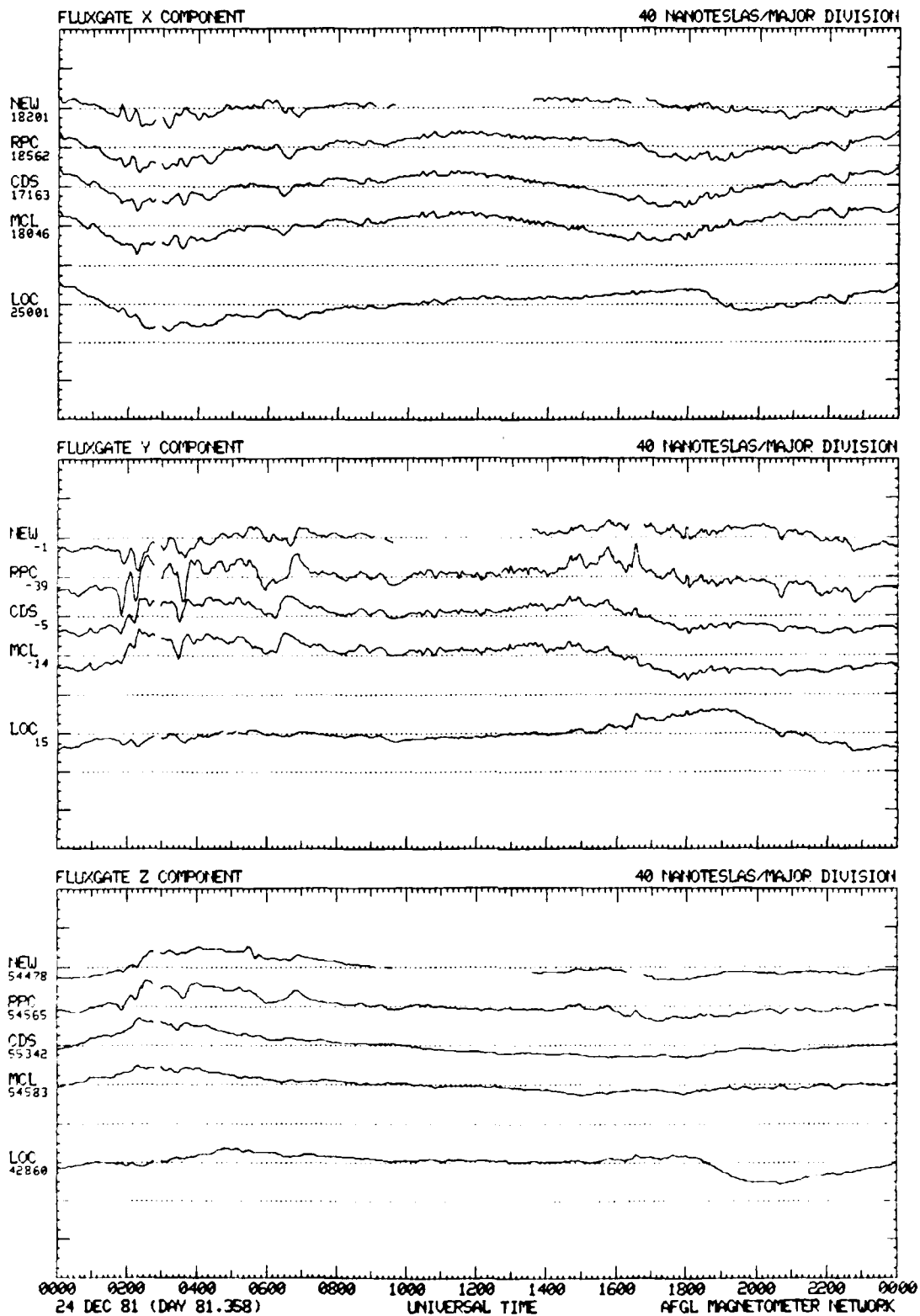


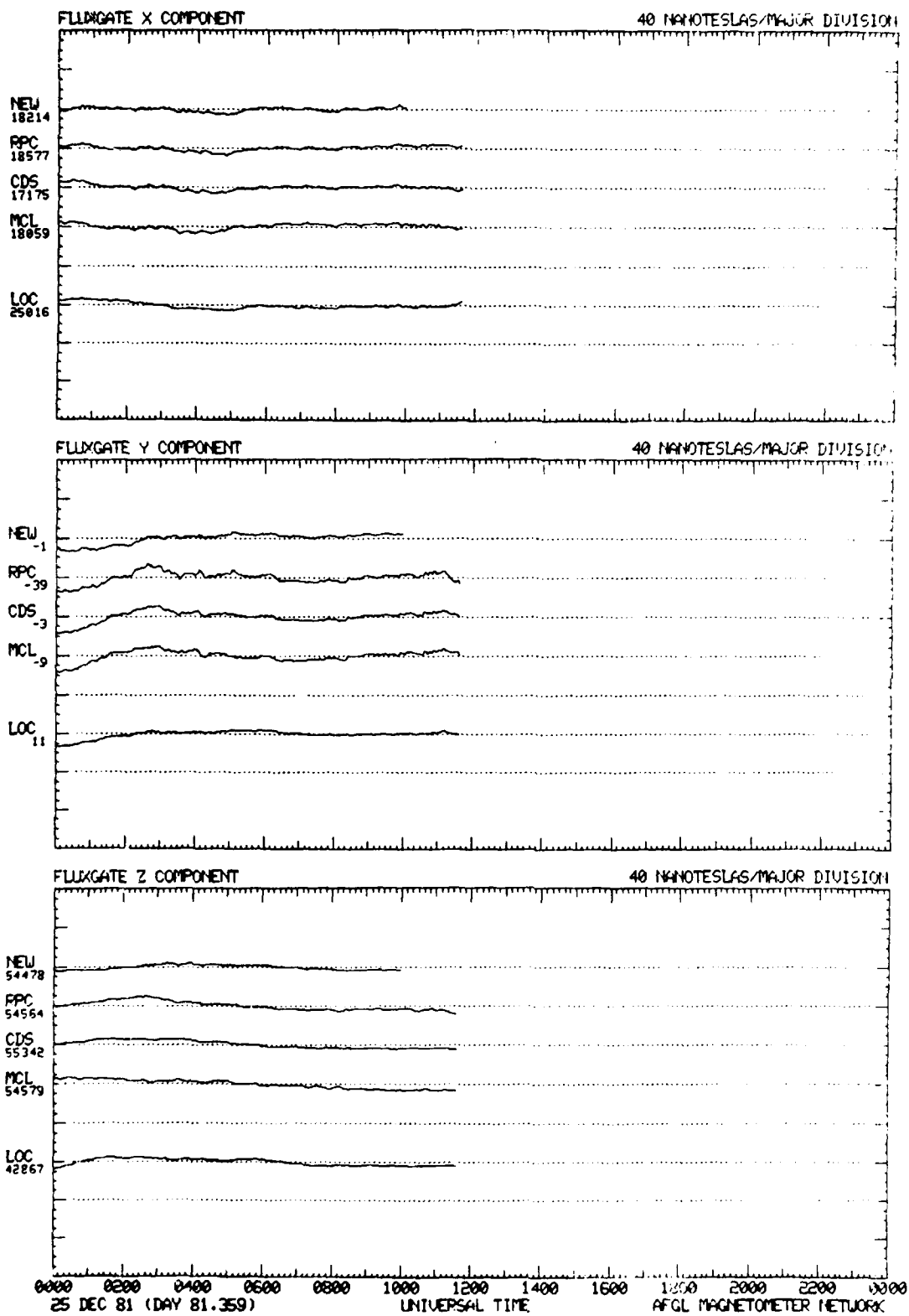


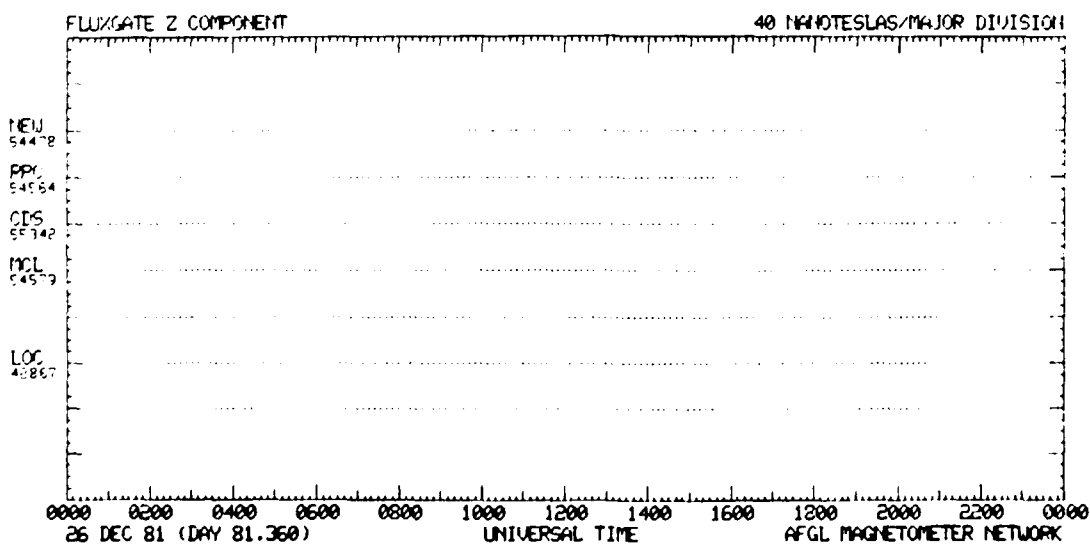
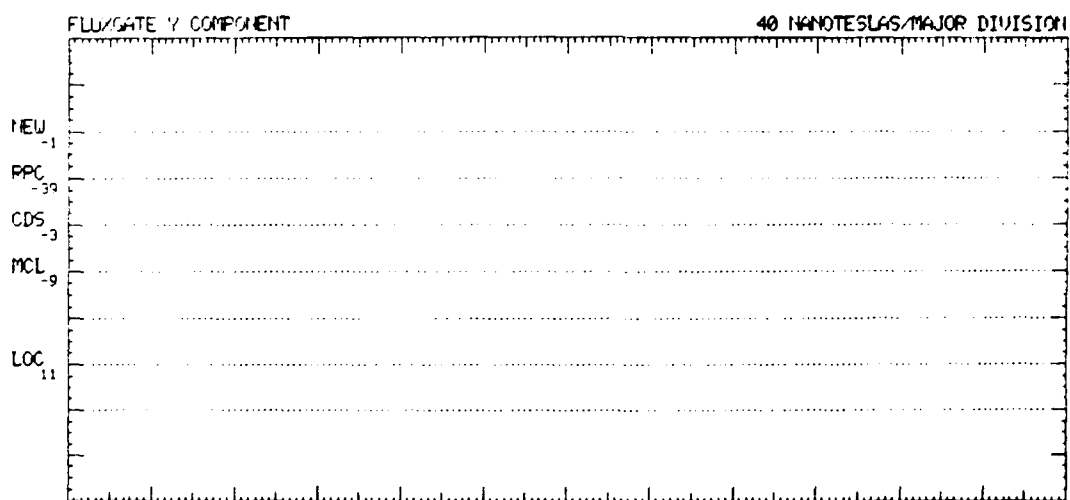
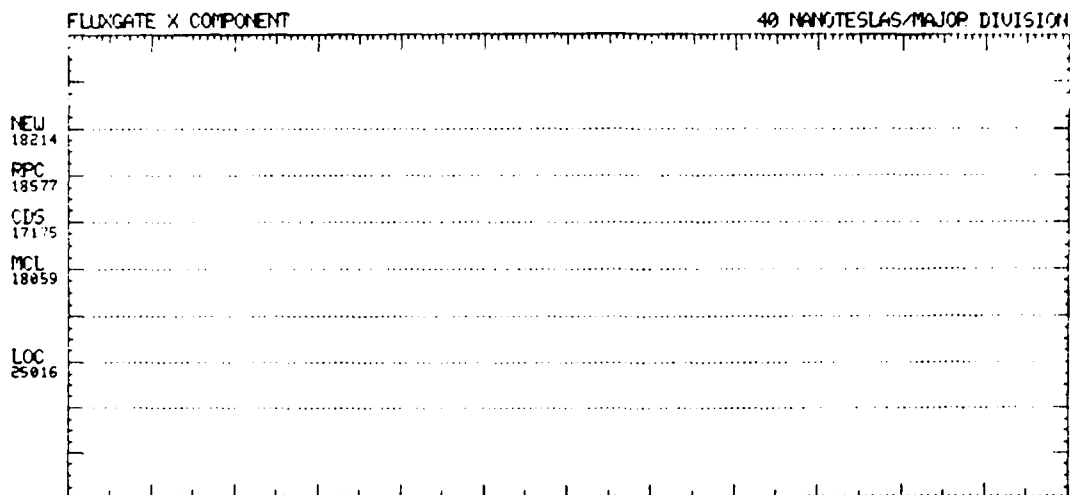












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26 DEC 81 (DAY 81.360) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK



FLUXGATE X COMPONENT

40 NANOTESLAS/MAJOR DIVISION

NEW  
15014  
RPC  
15014  
CDS  
17170  
MCL  
18059  
LOC  
25016

FLUXGATE Y COMPONENT

40 NANOTESLAS/MAJOR DIVISION

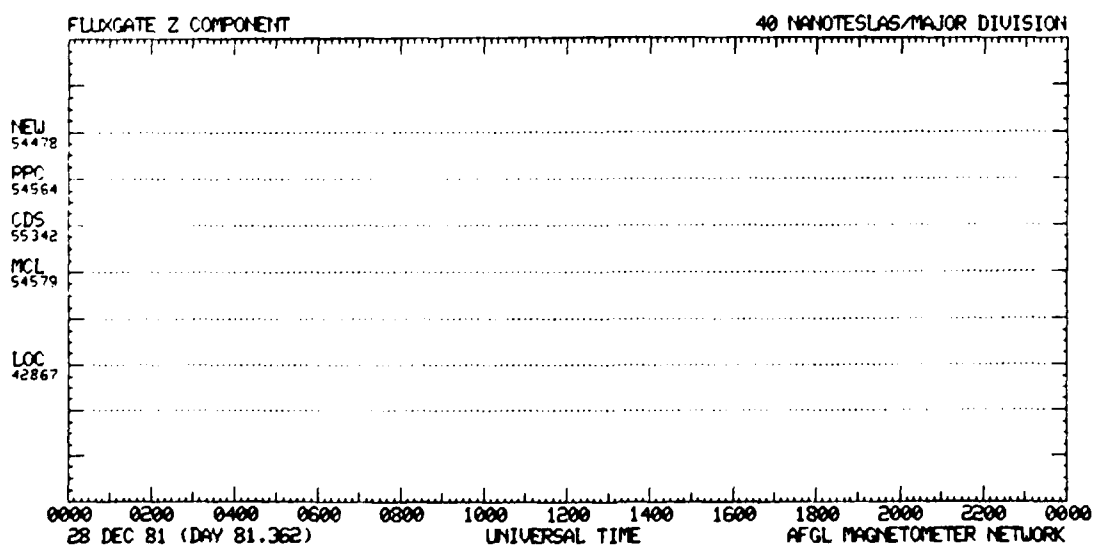
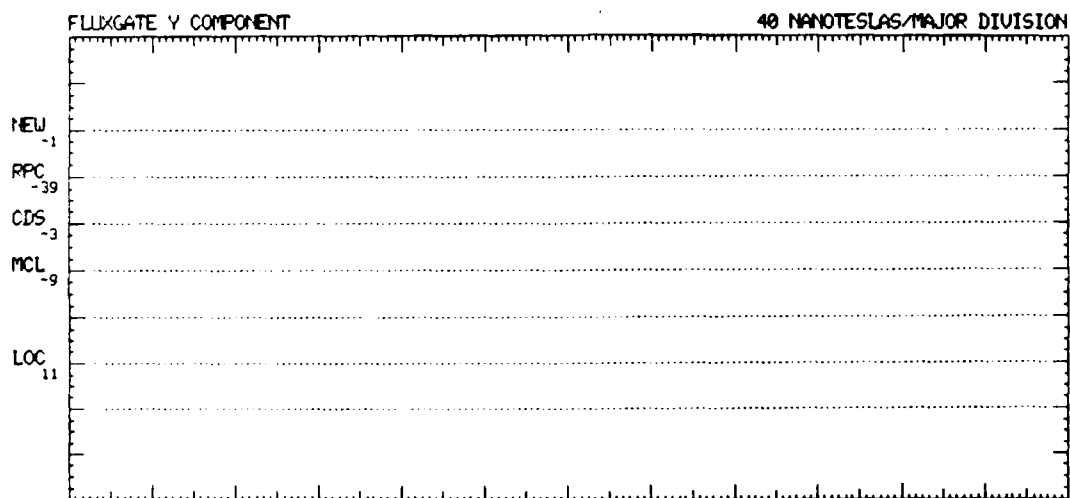
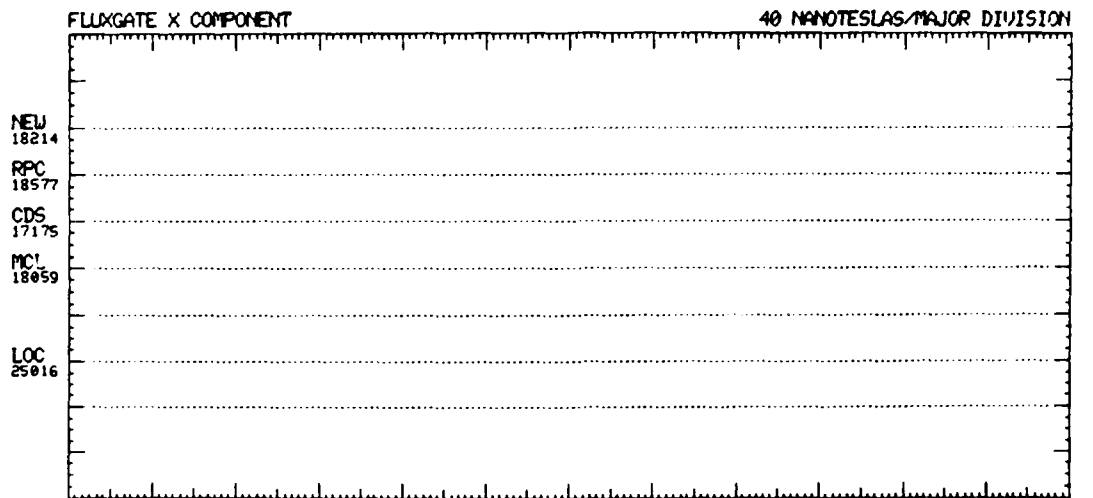
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-3  
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-9  
LOC  
11

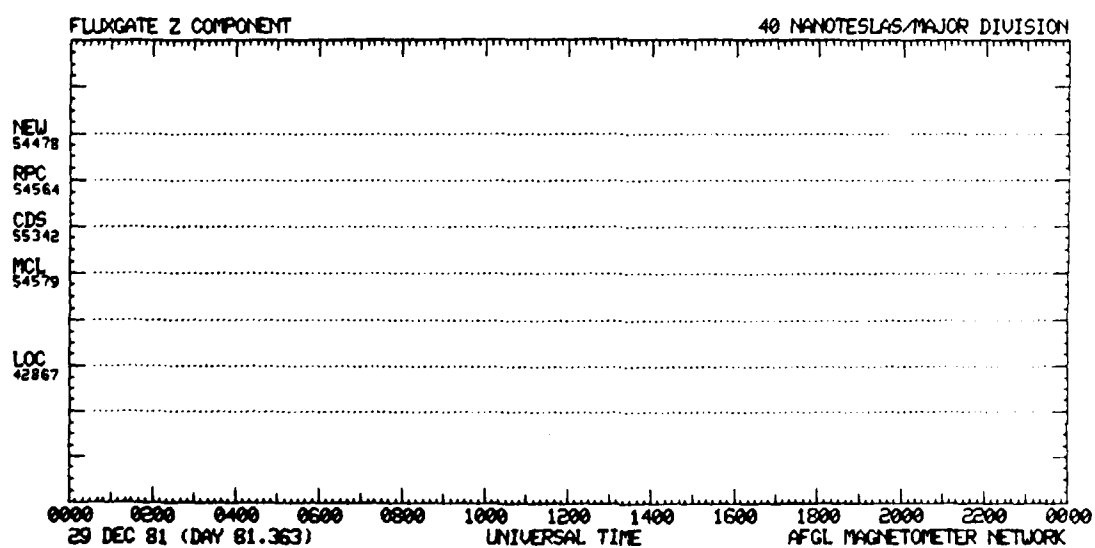
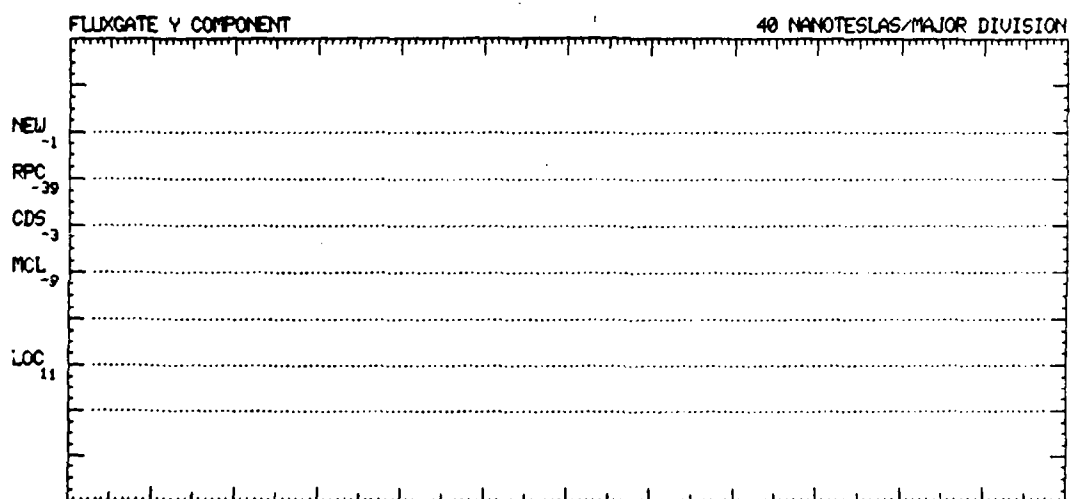
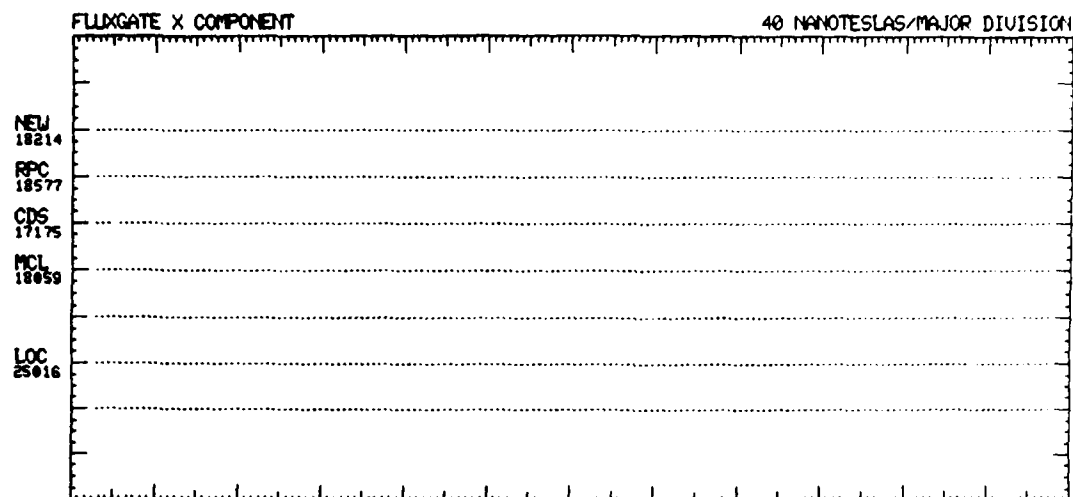
FLUXGATE Z COMPONENT

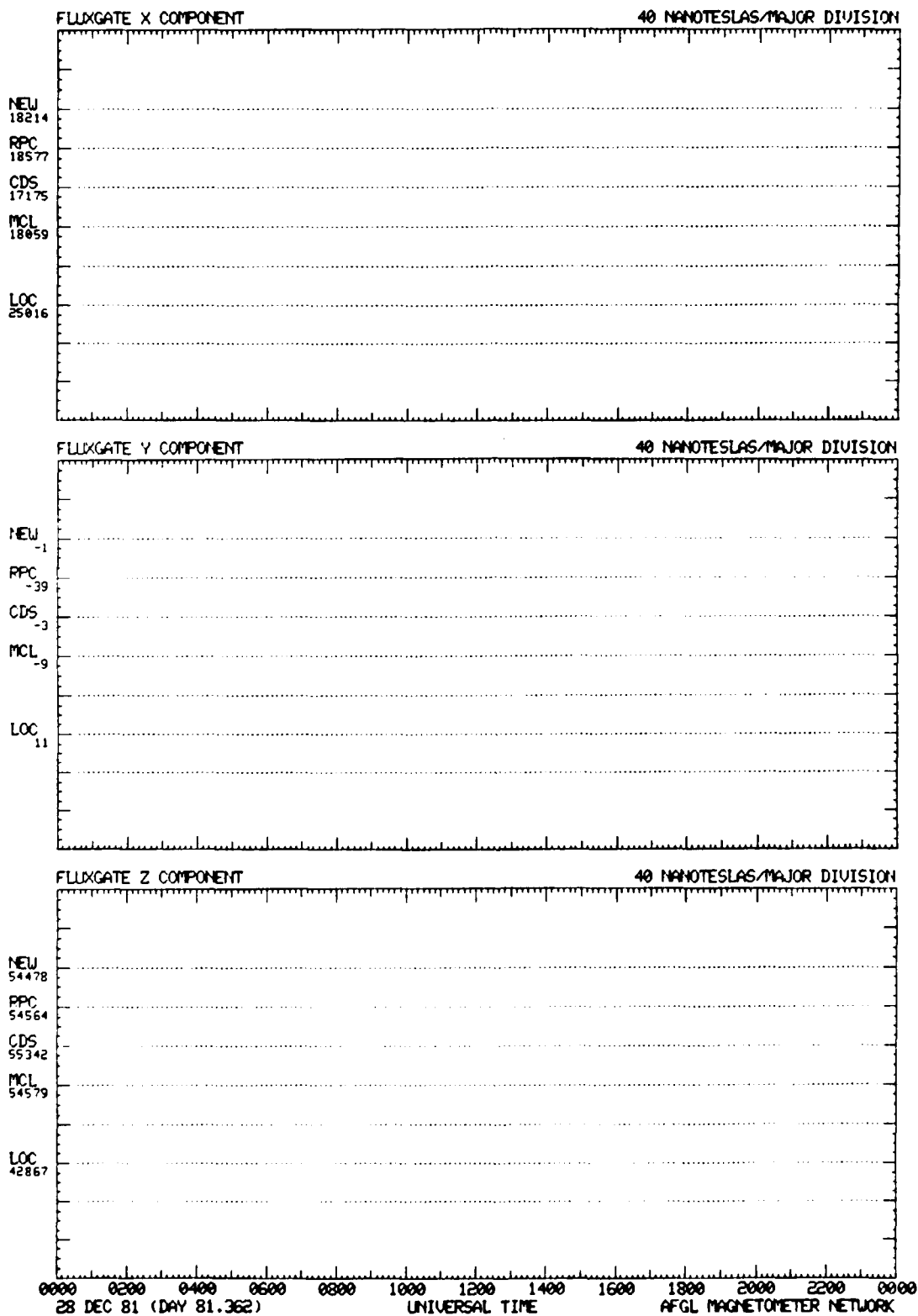
40 NANOTESLAS/MAJOR DIVISION

NEW  
54478  
RPC  
54564  
CDS  
55340  
MCL  
57579  
LOC  
42307

0000 0200 0400 0600 0800 1000 1200 1400 1600 1800 2000 2200 0000  
27 DEC 81 (DAY 81.361) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK



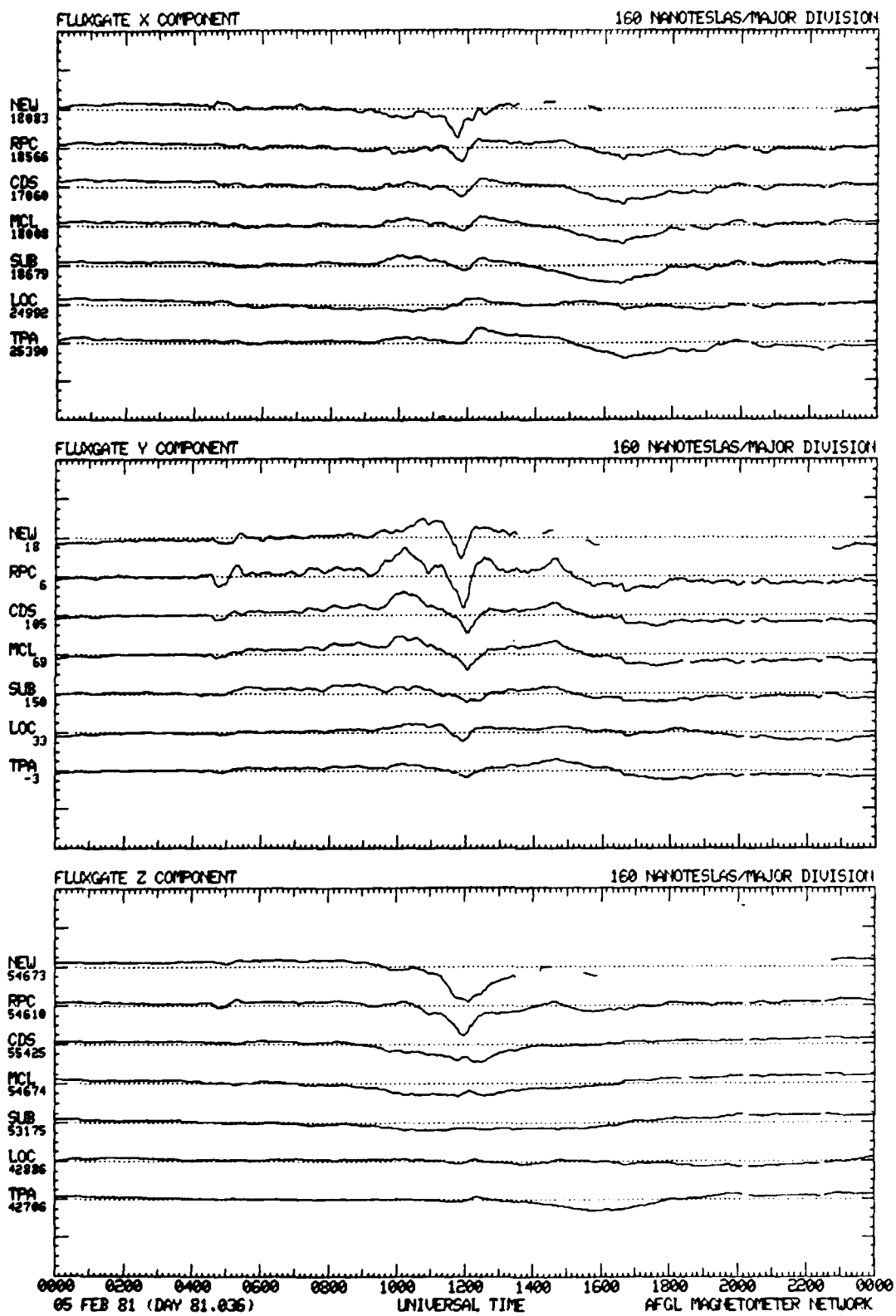


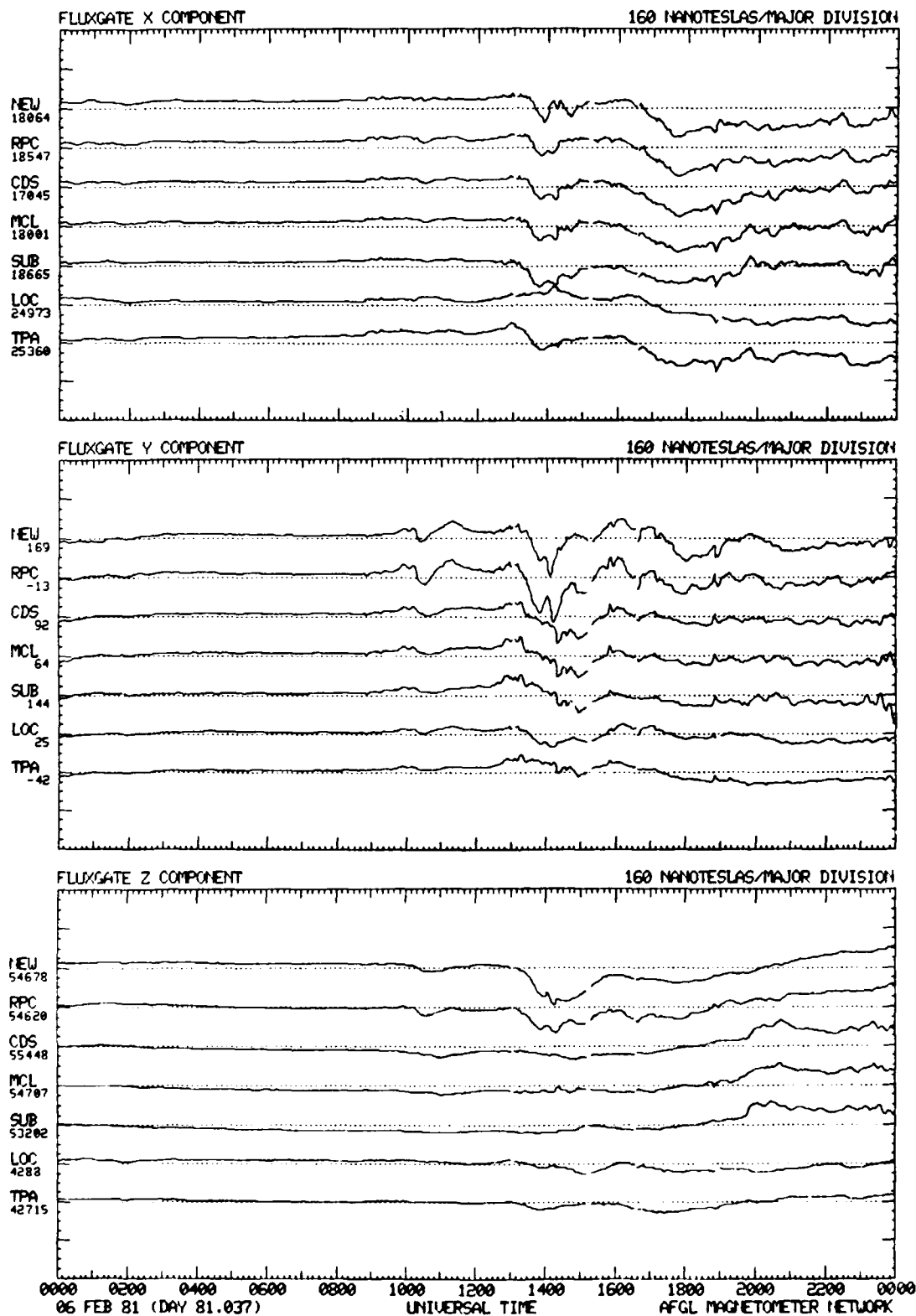


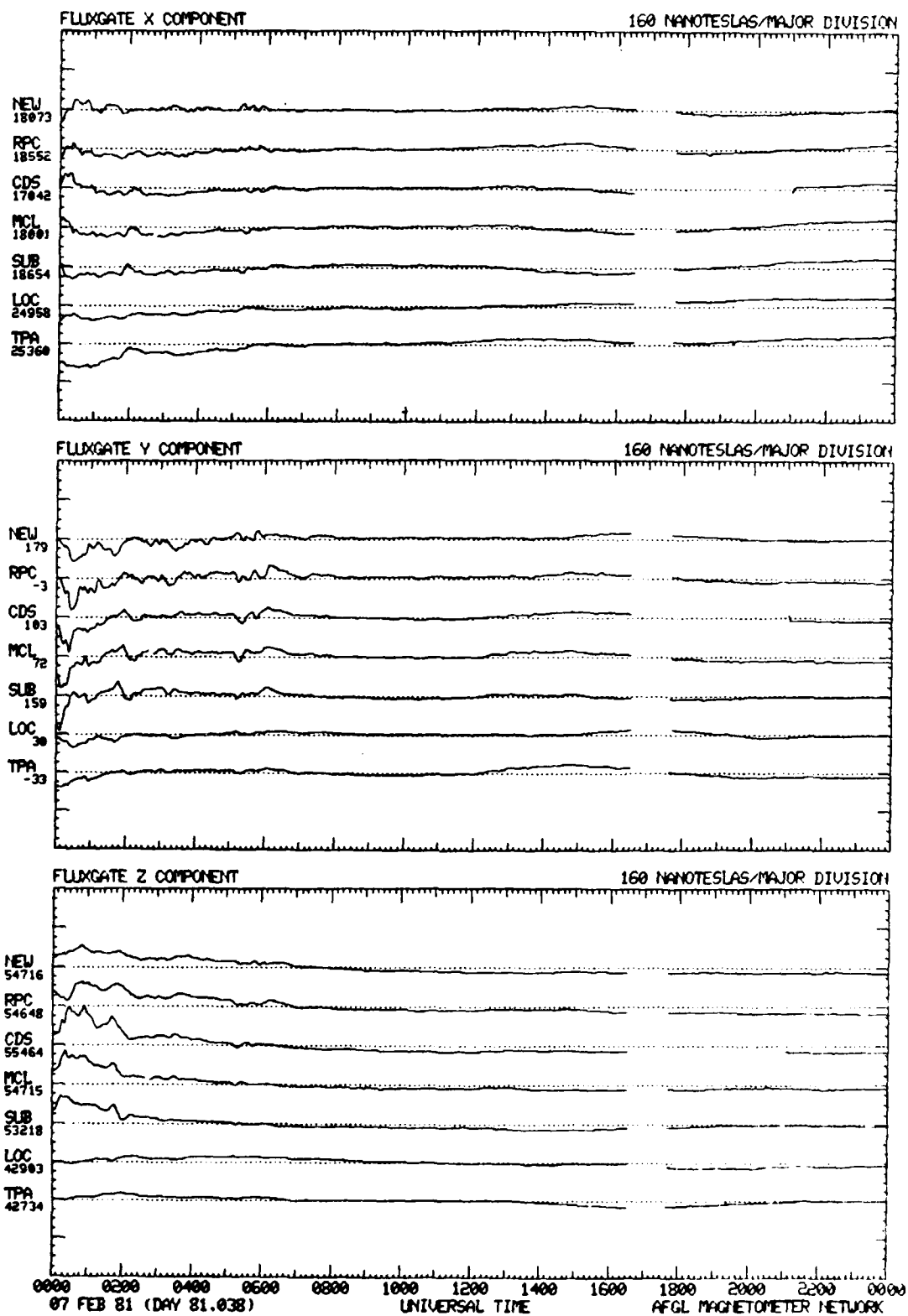
## 8. SUPPLEMENTARY PLOTS AT REDUCED AMPLITUDE

This section presents a stacked-magnetogram plot for each of the following days of 1981, using an amplitude scale of 160 or 400 nT per major division:

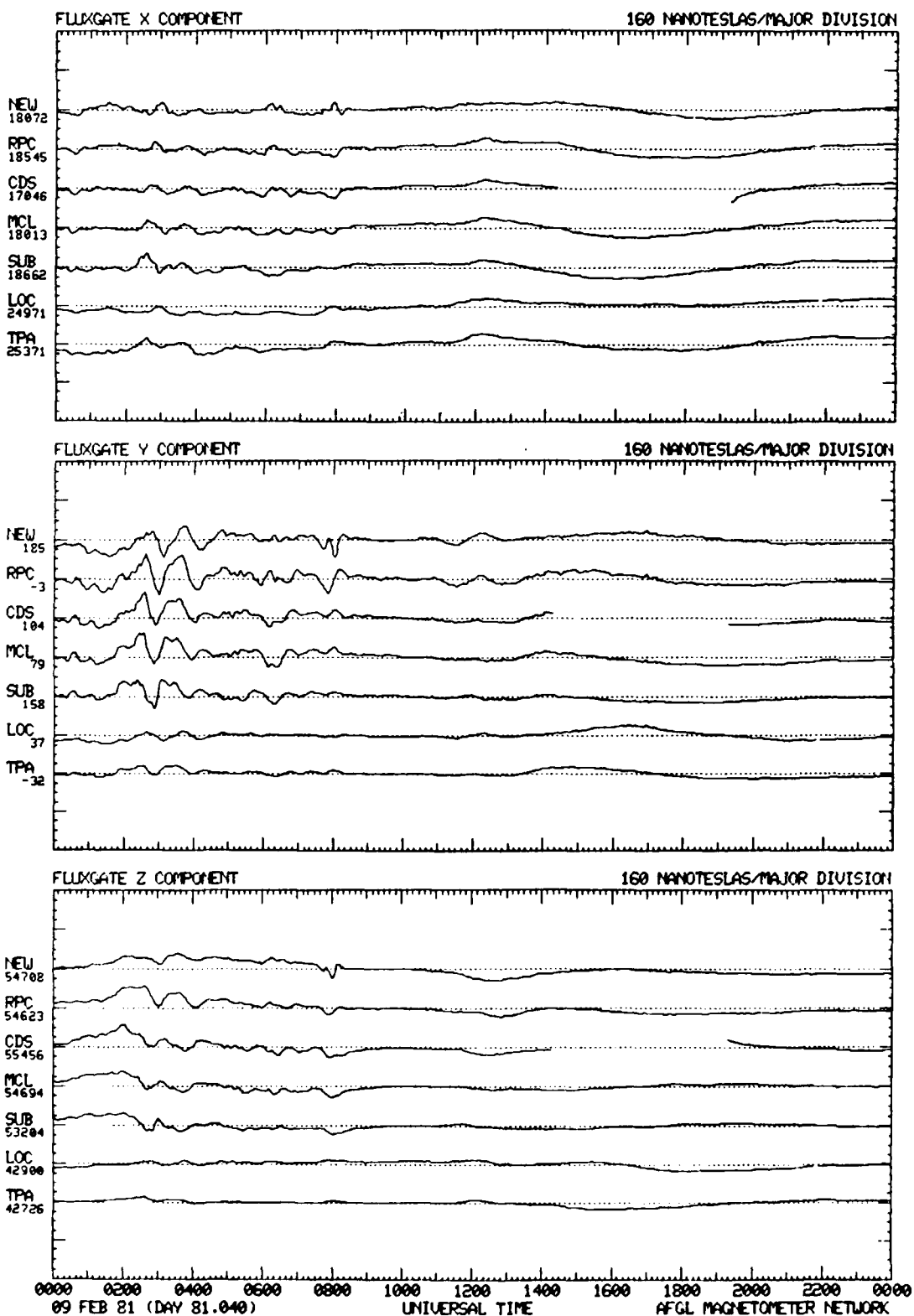
January	none
February	05, 06, 07, 09
March	02, 05, 14, 15, 25, 26
April	11, 12, 13, 14, 21, 22, 26, 27, 29
May	09, 10, 11, 15, 16, 17, 18
June	none
July	17, 25, 26
August	29
September	18, 19
October	08, 11, 14, 15, 20, 21, 22, 23
November	08, 11, 12, 14
December	none

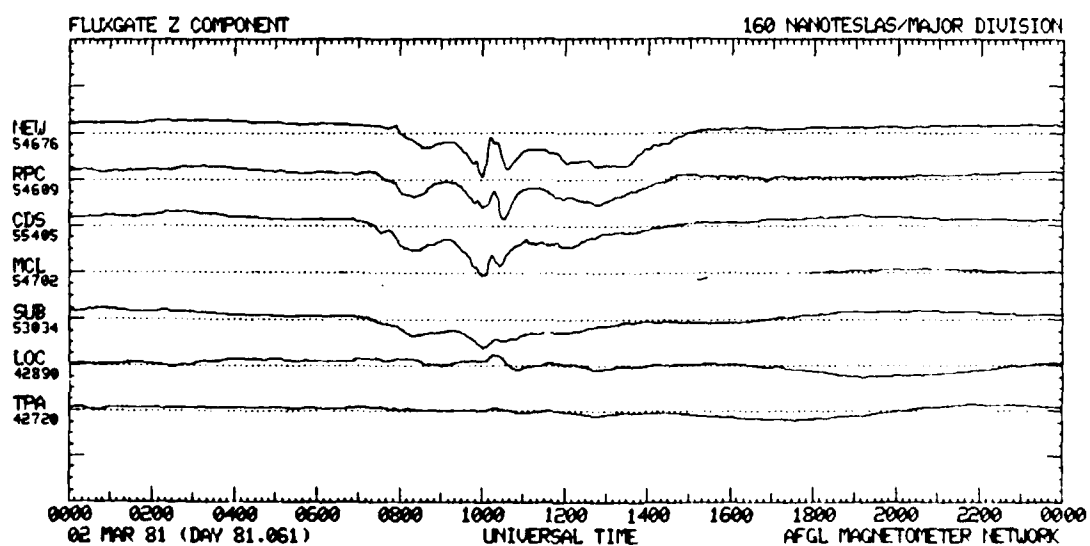
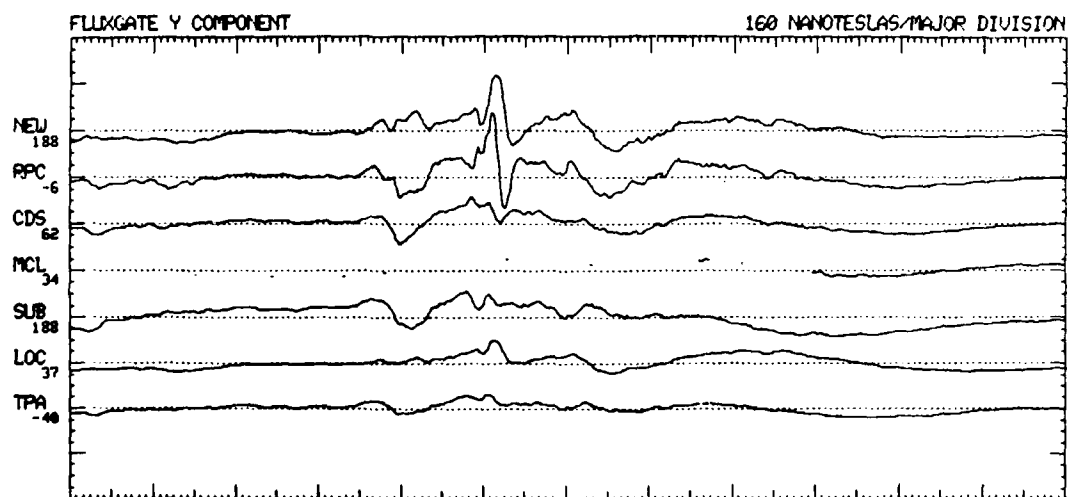
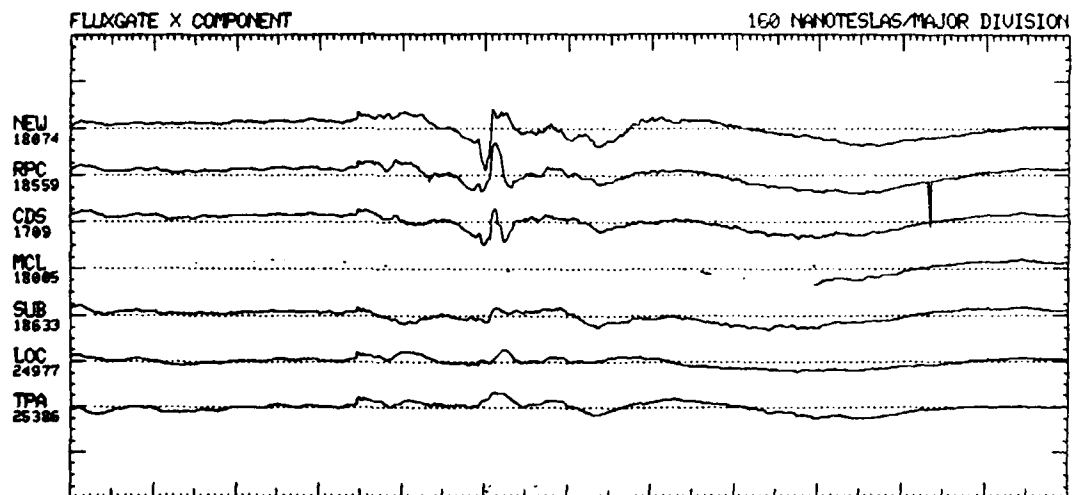


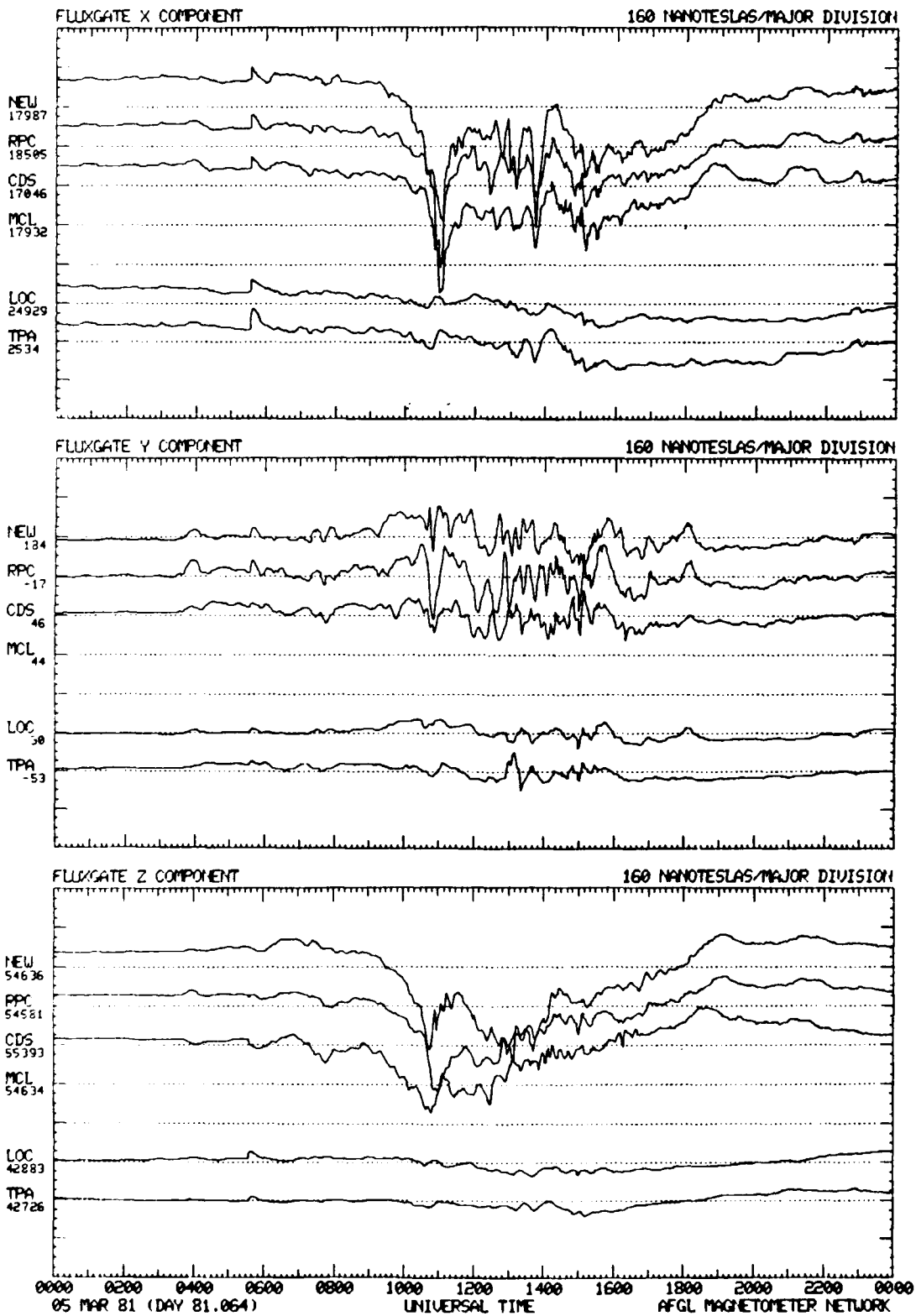


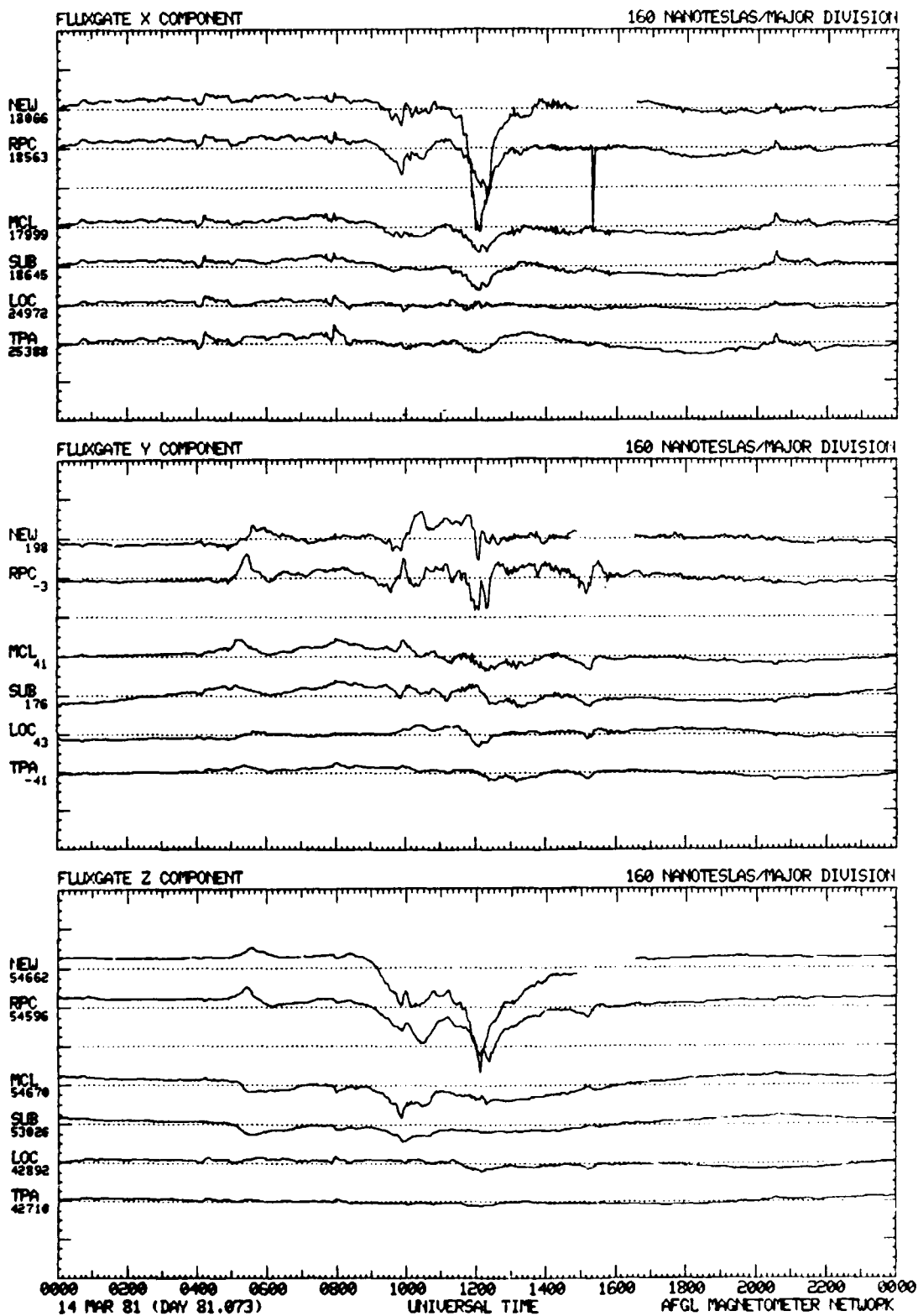












AD-A173 958

DAILY MAGNETOGRAMS FOR 1981 FROM THE AFGL (AIR FORCE  
GEOPHYSICS LABORATORY) NETWORK(U) AIR FORCE GEOPHYSICS  
LAB HANSCOM AFB MA D J KNECHT 28 FEB 85

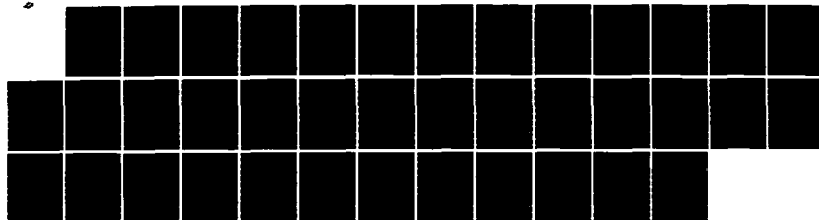
5/5

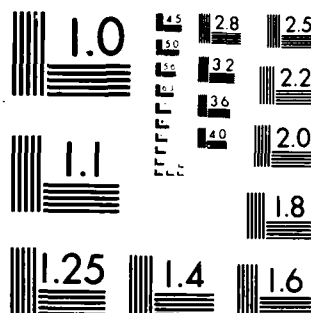
UNCLASSIFIED

AFGL-TR-85-0030

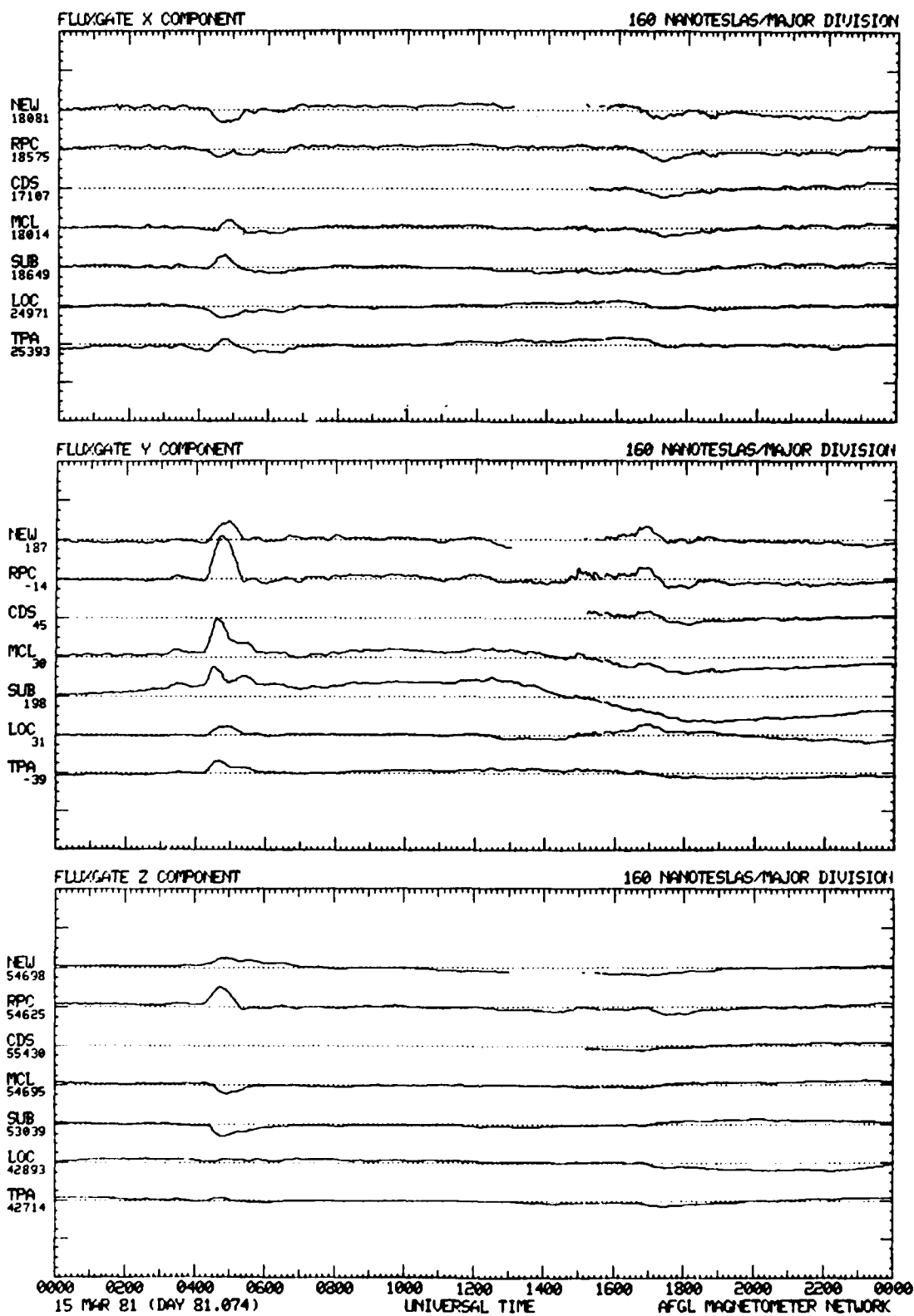
F/G 4/1

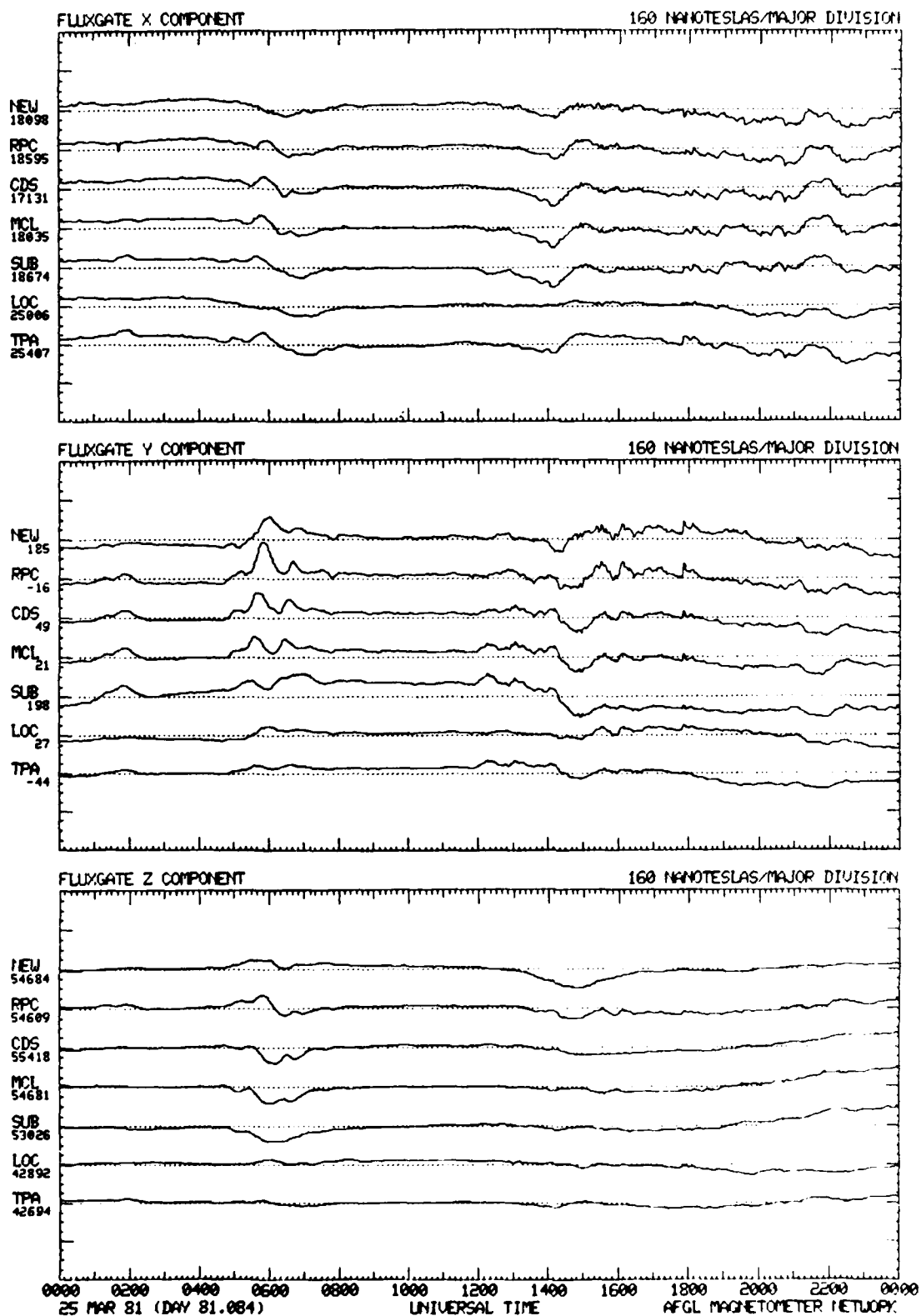
NL



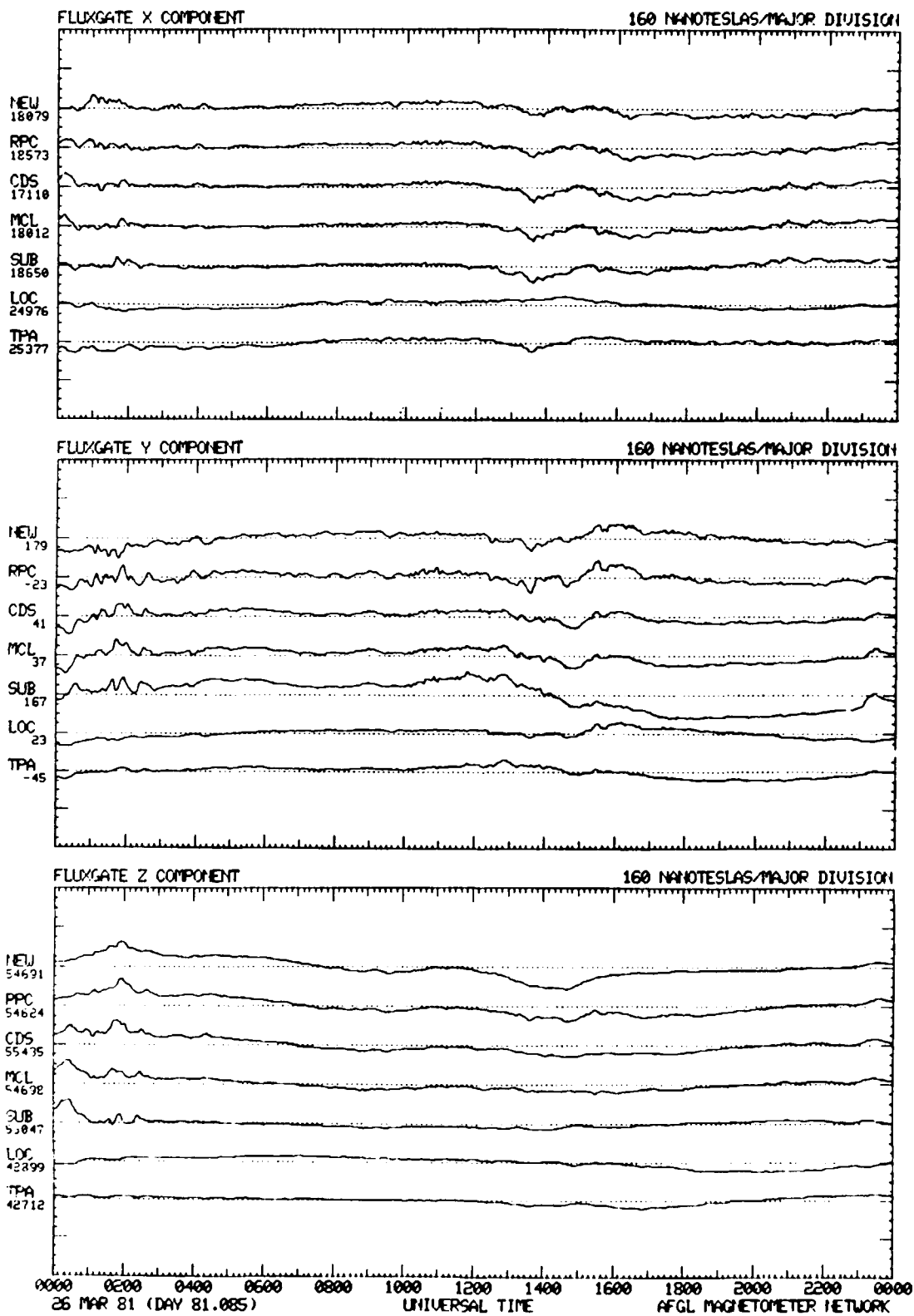


MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A



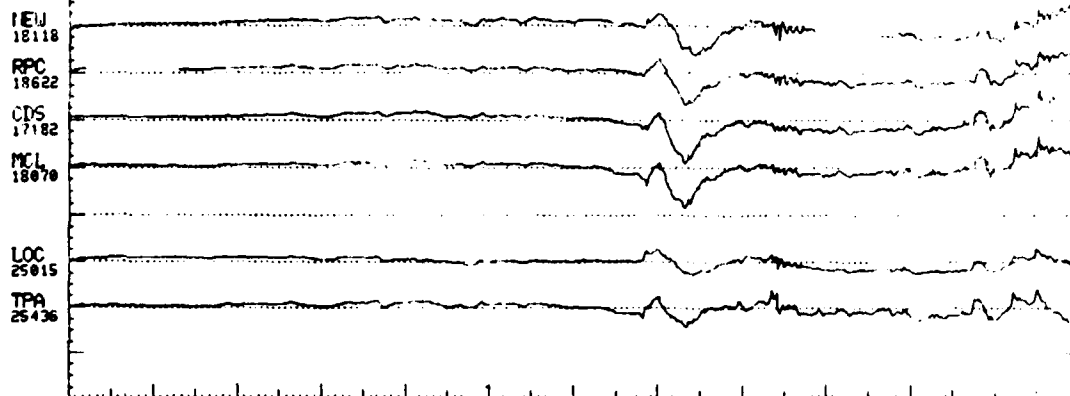






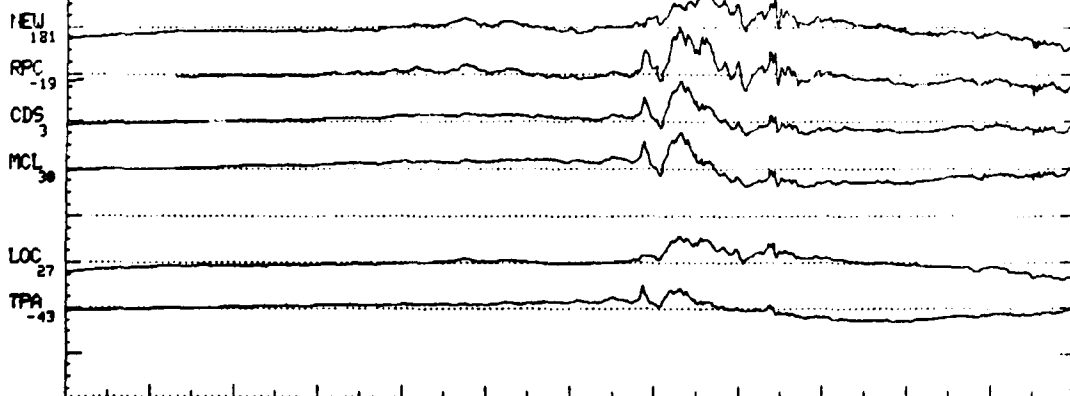
FLUXGATE X COMPONENT

160 NANOTESLAS/MAJOR DIVISION



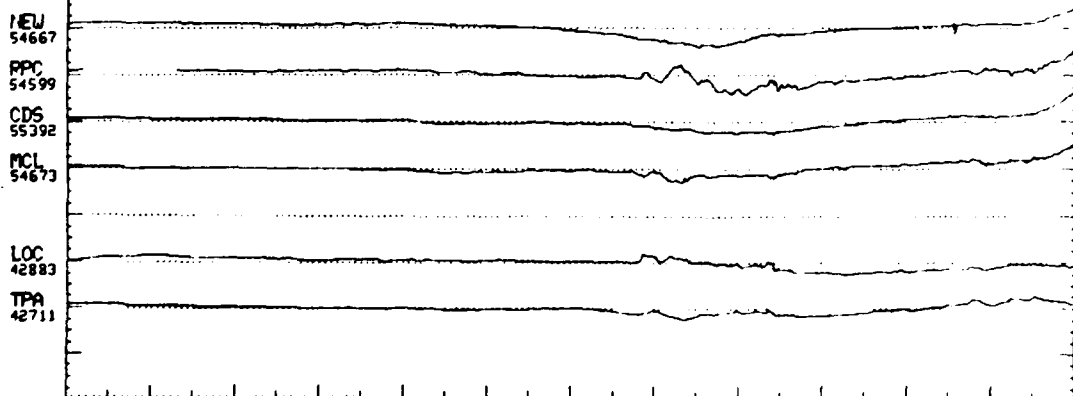
FLUXGATE Y COMPONENT

160 NANOTESLAS/MAJOR DIVISION

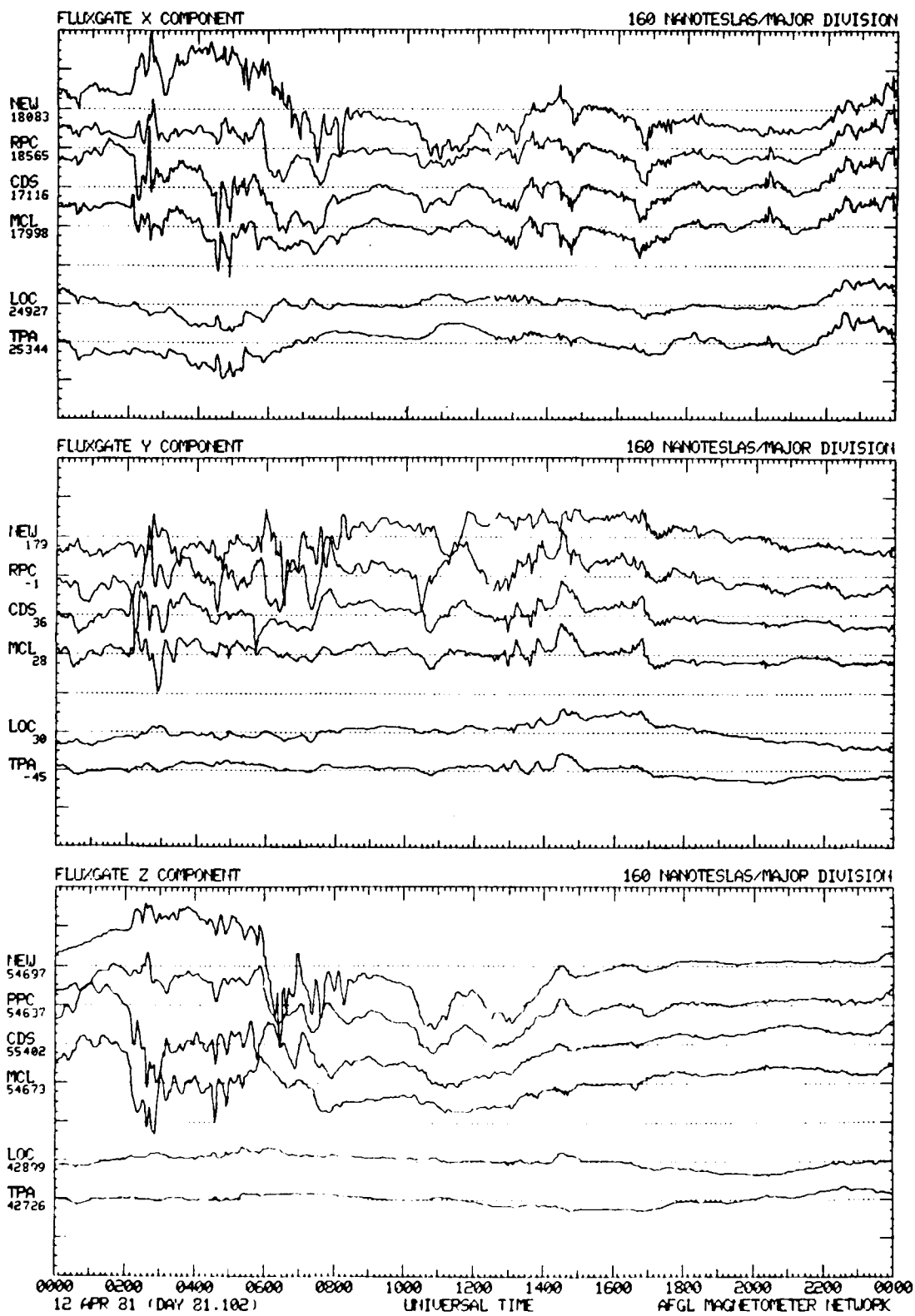


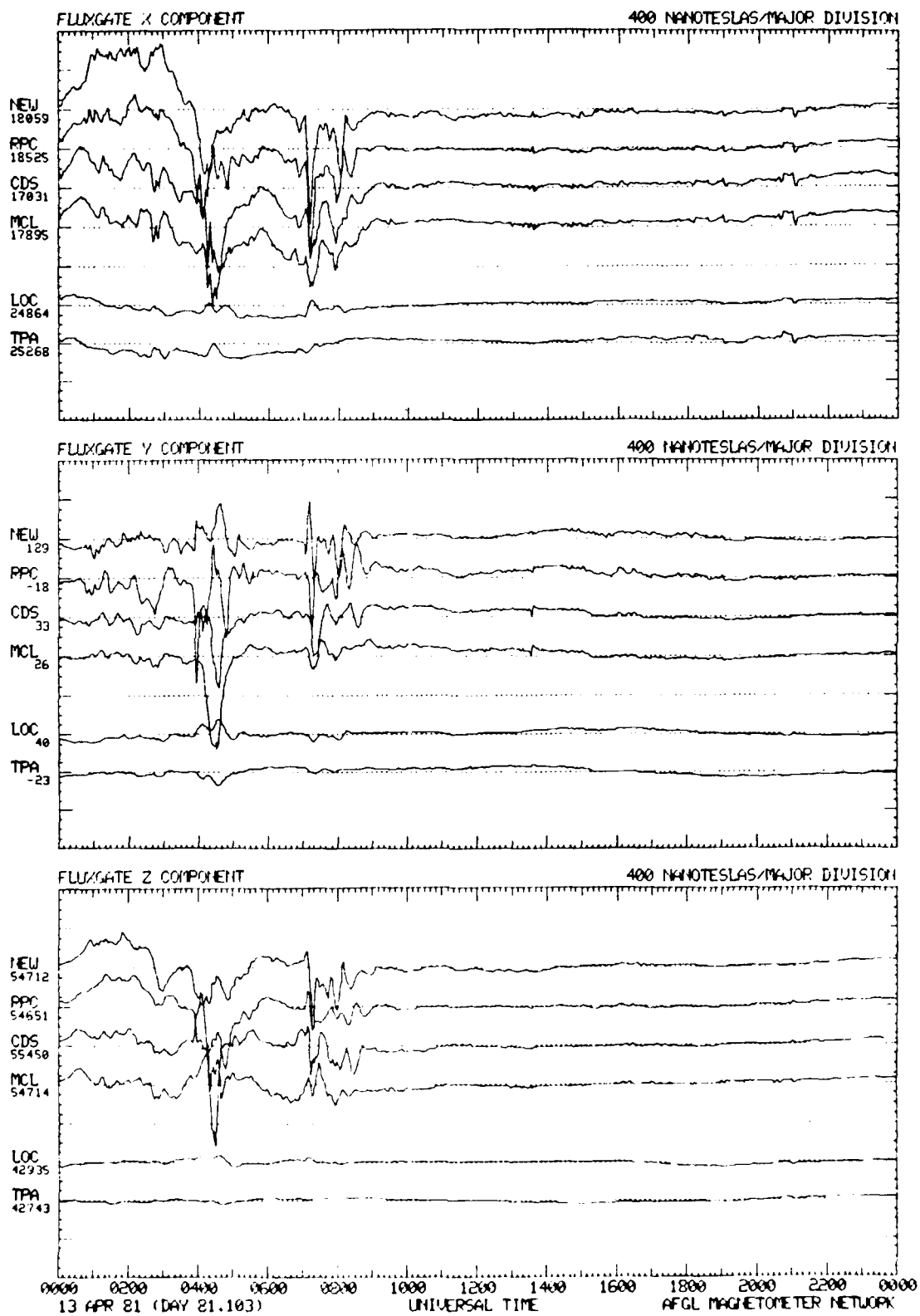
FLUXGATE Z COMPONENT

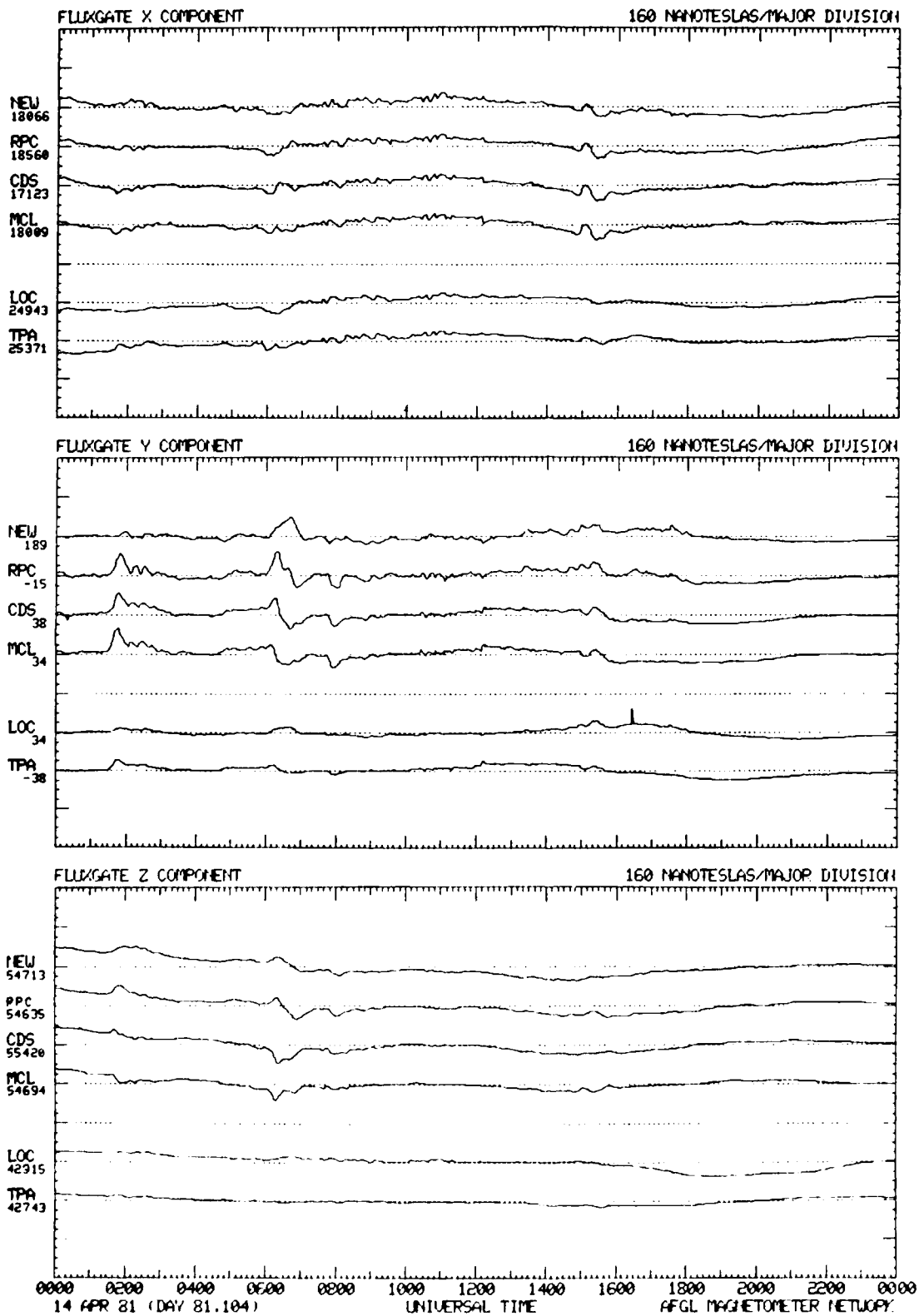
160 NANOTESLAS/MAJOR DIVISION

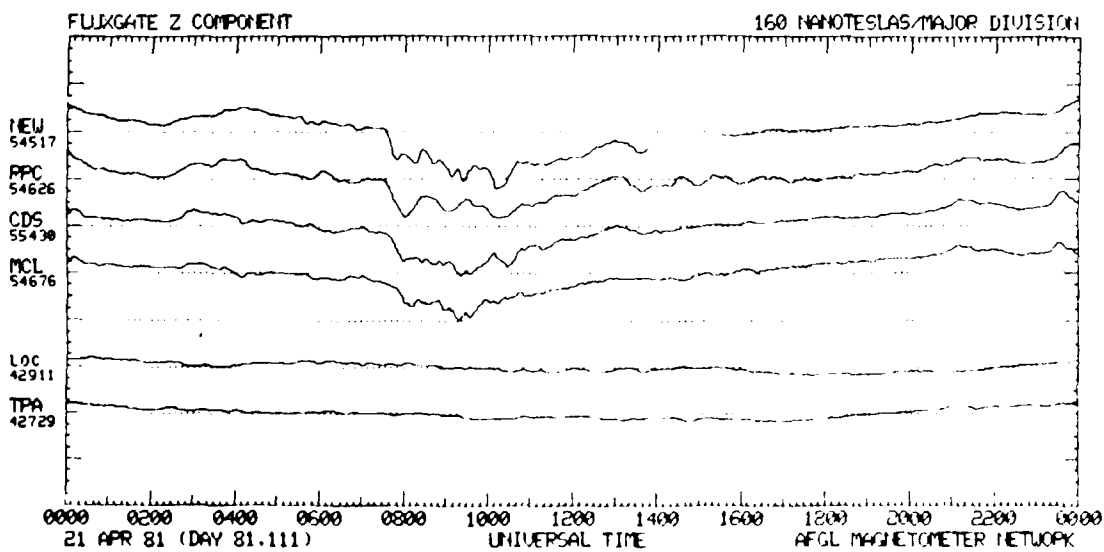
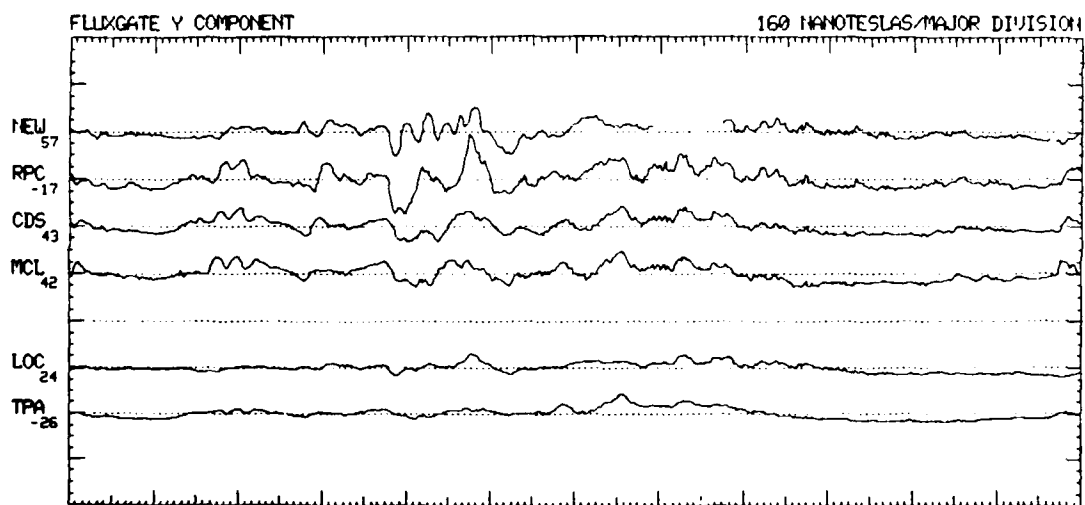
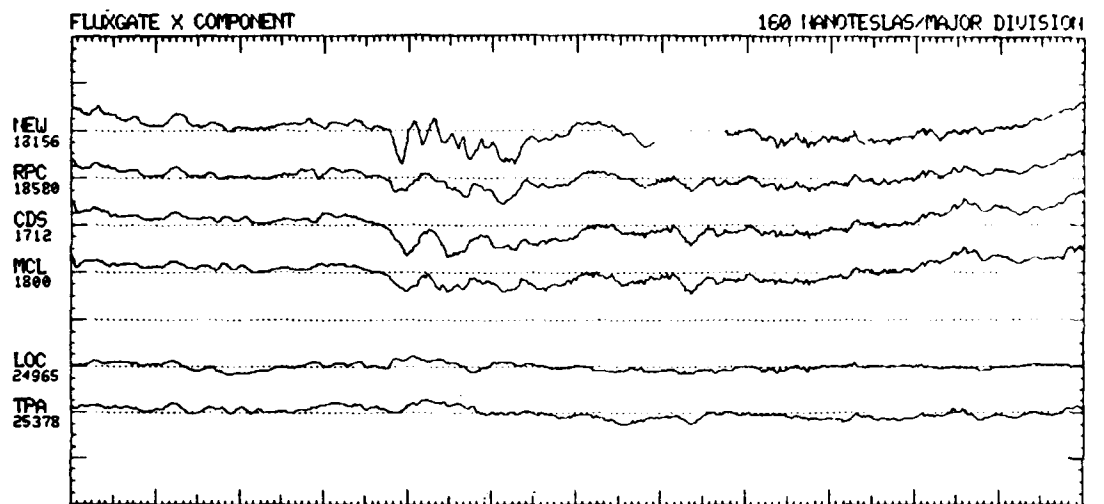


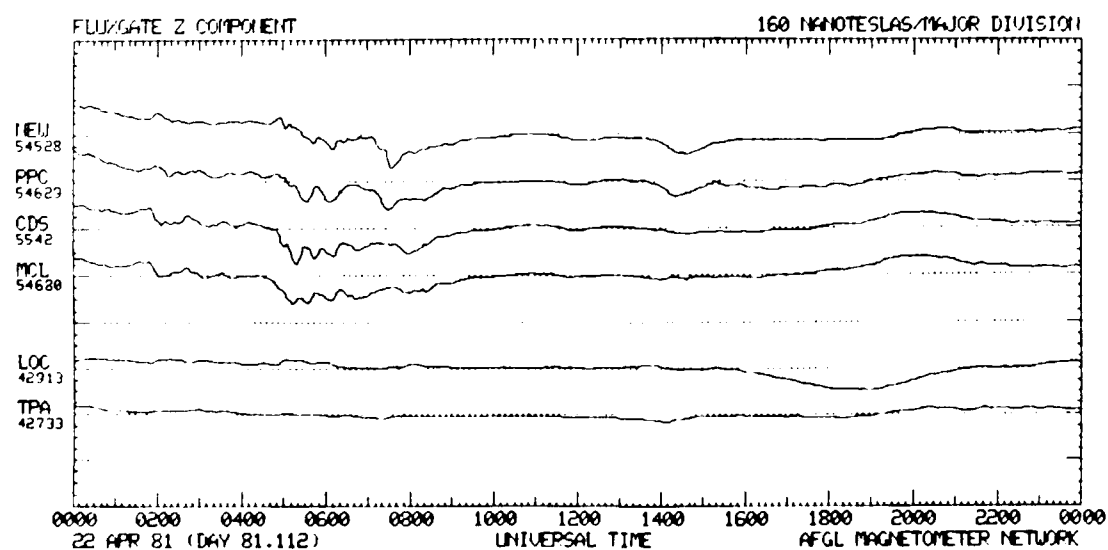
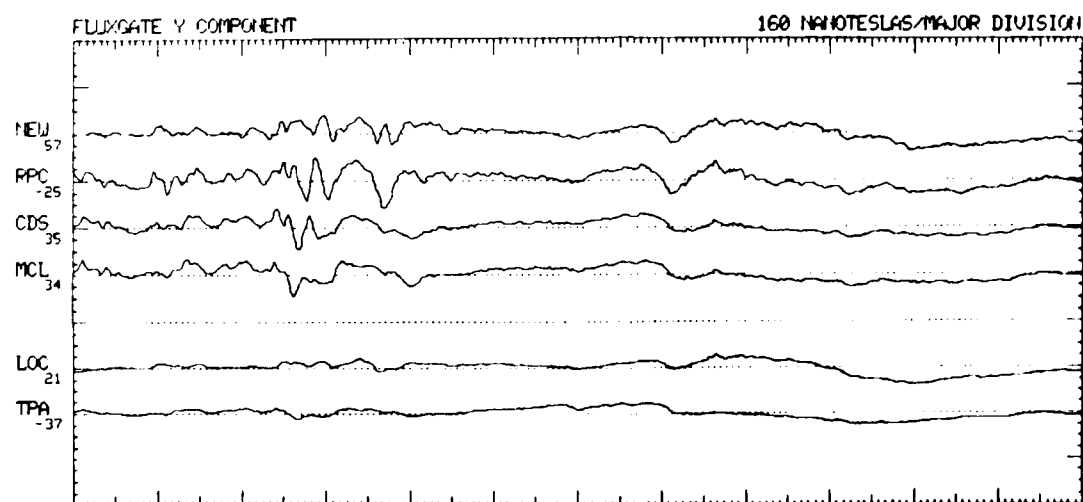
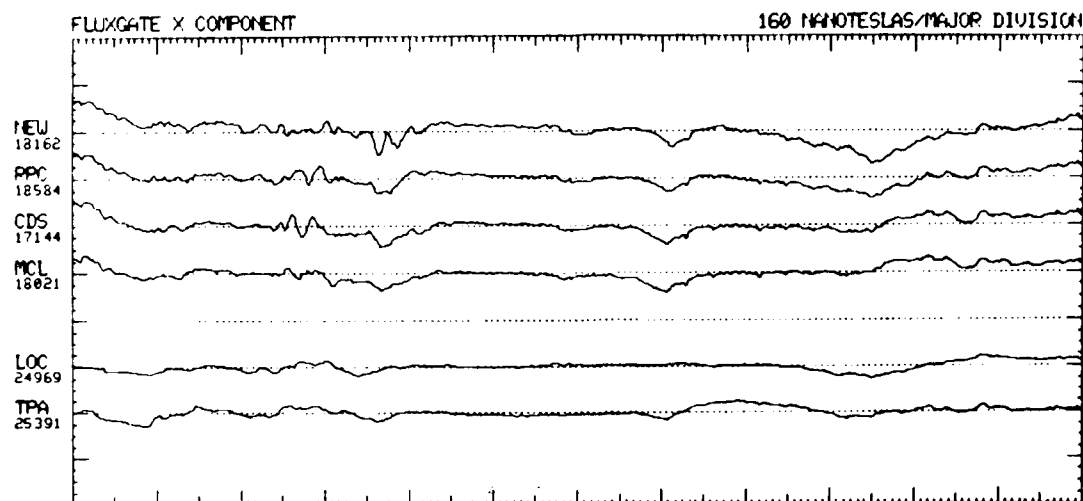
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11 APR 81 (DAY 81.101) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

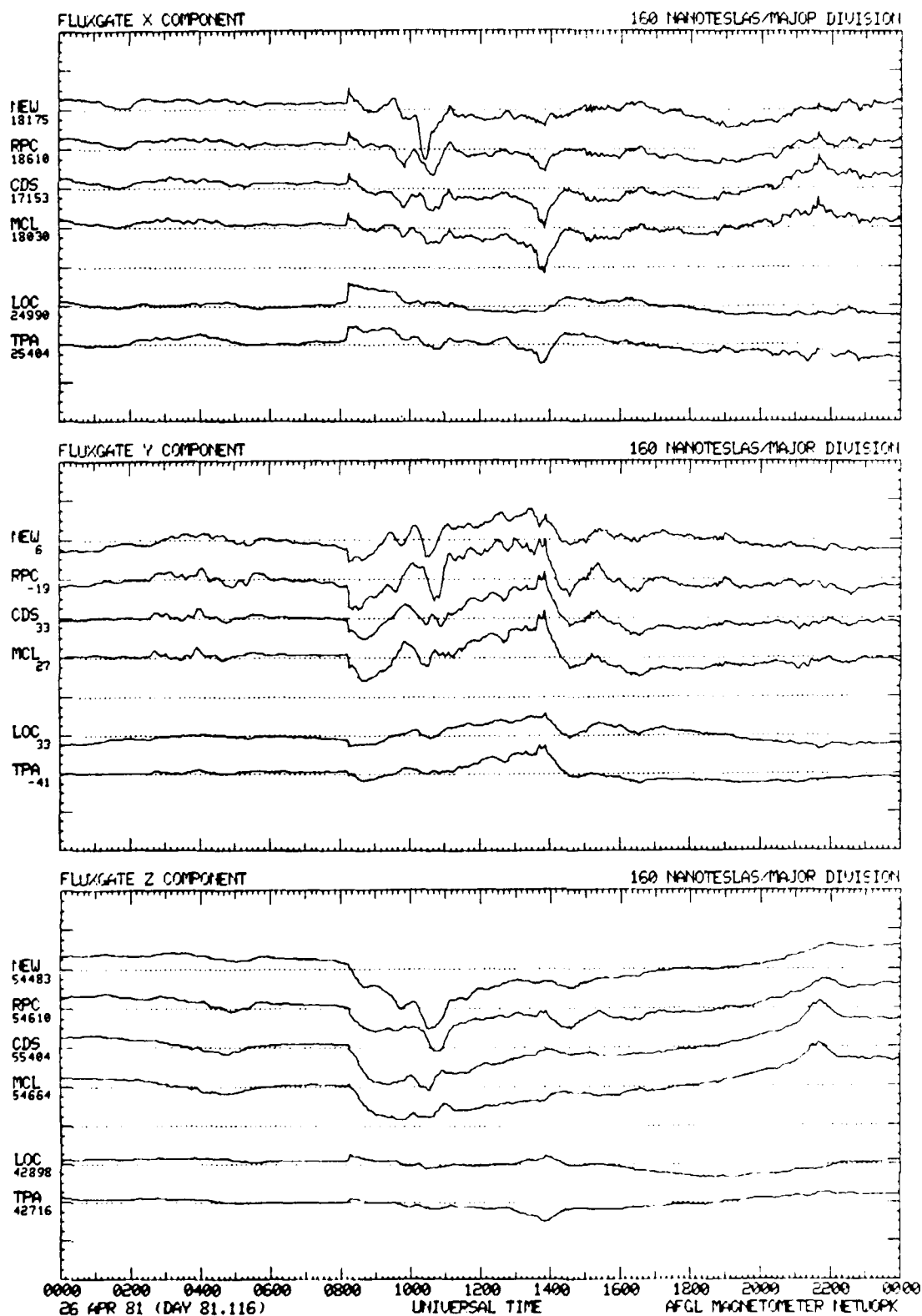




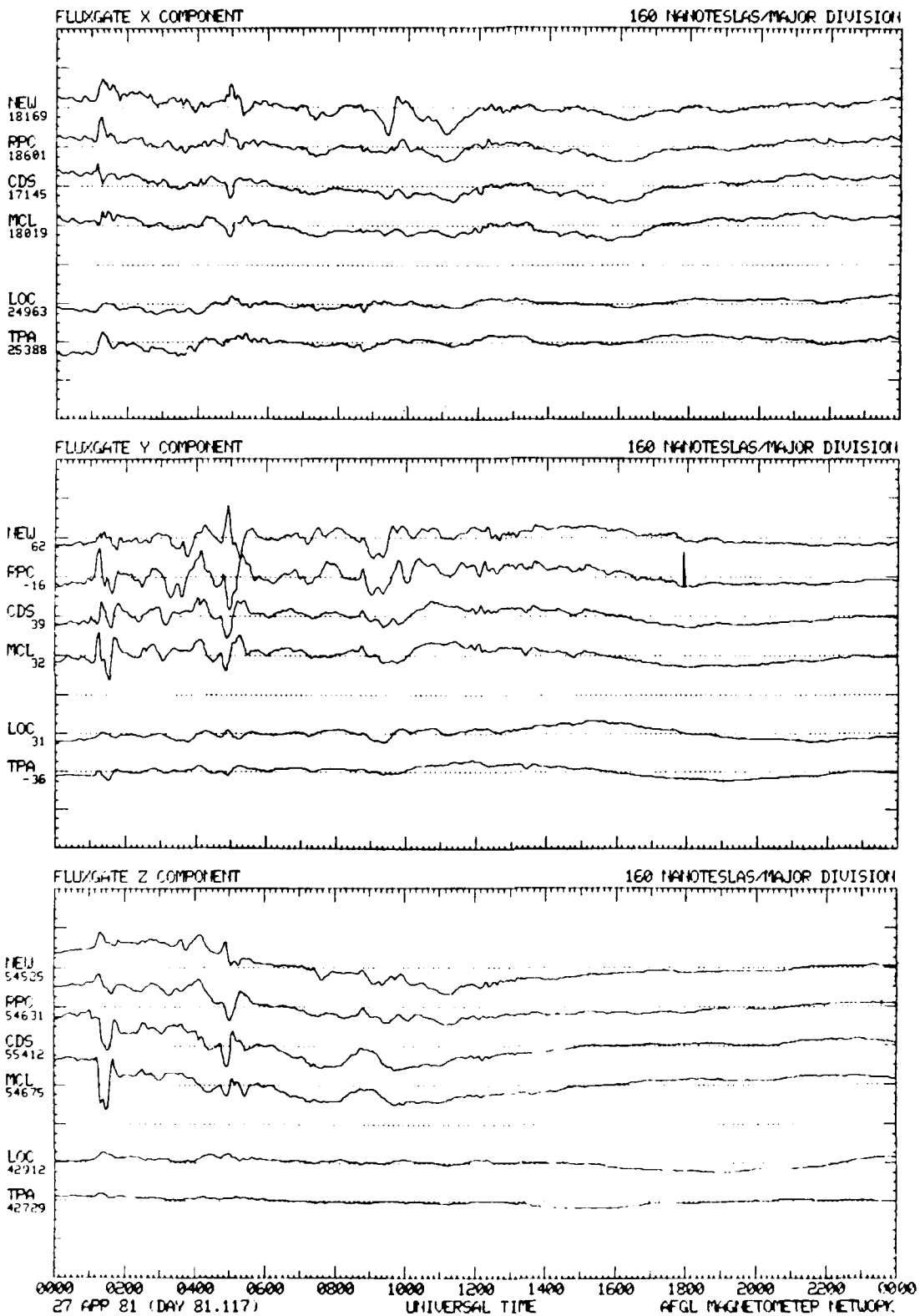


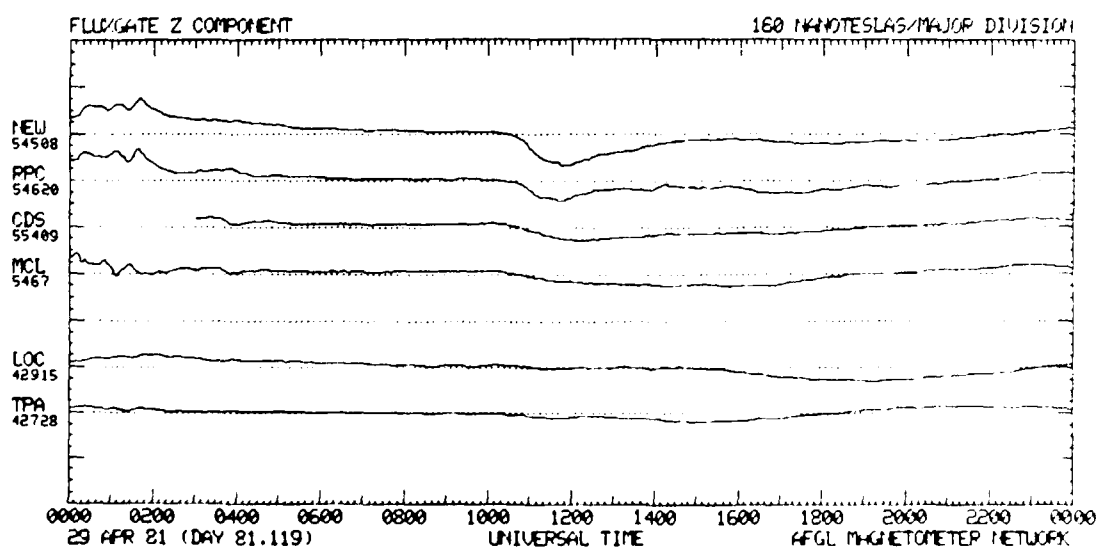
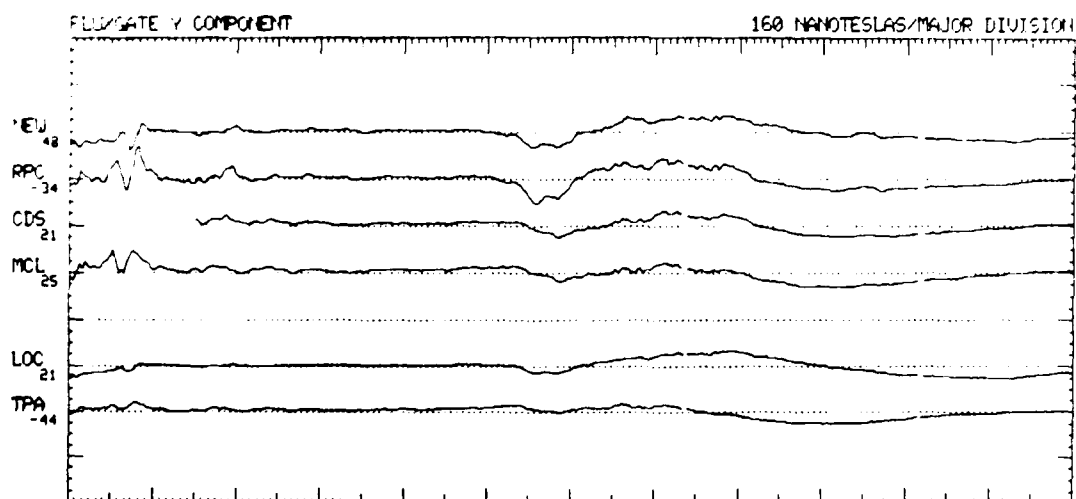
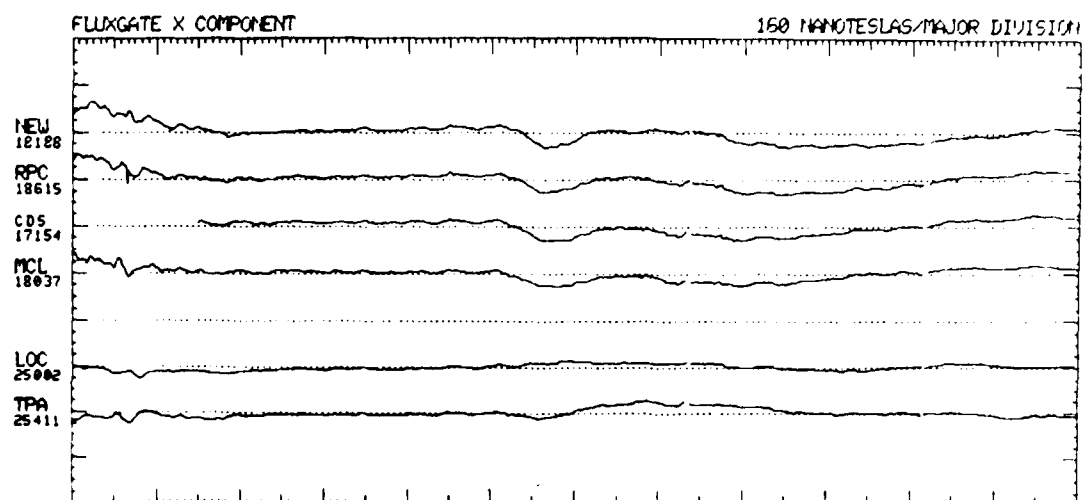


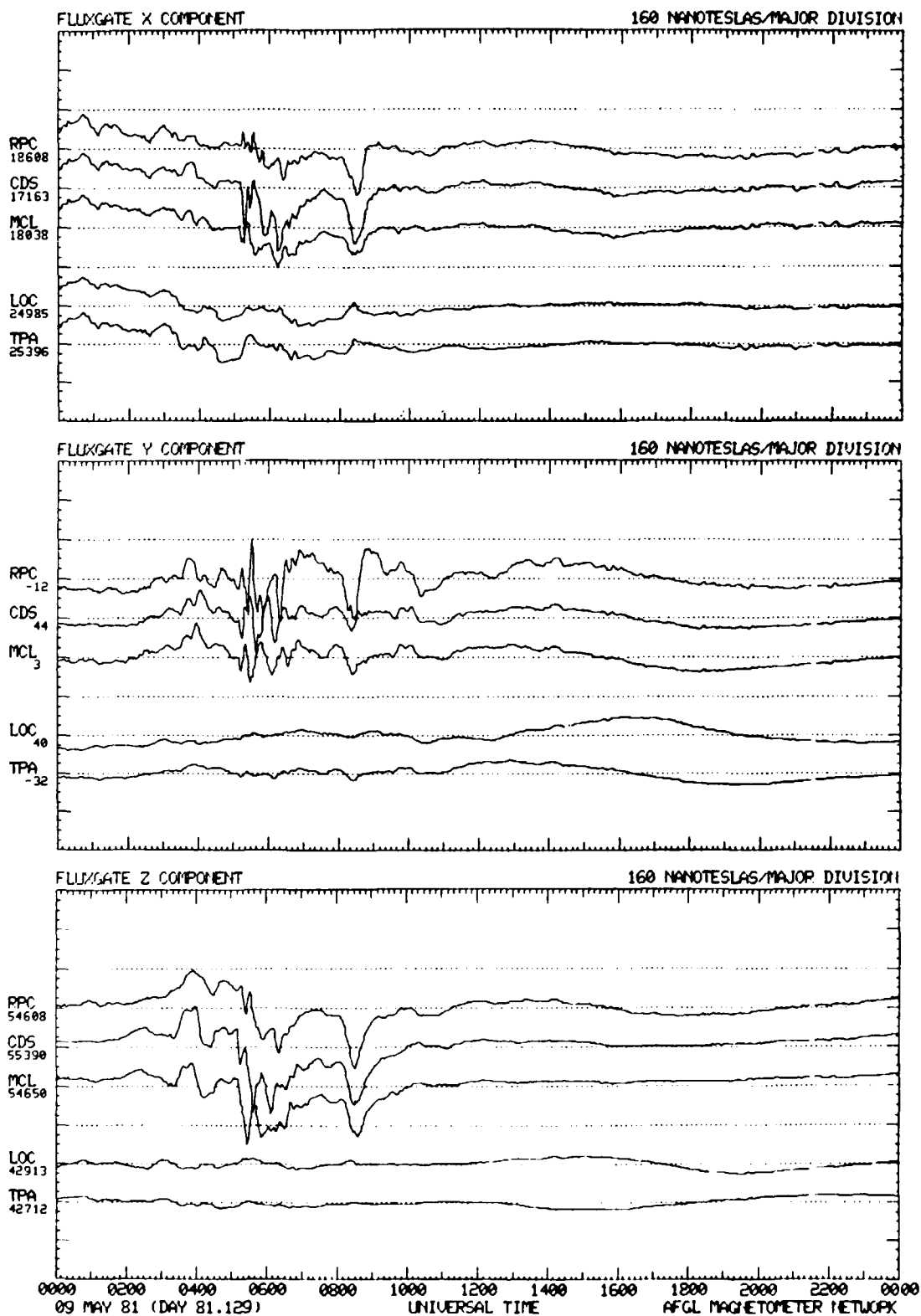


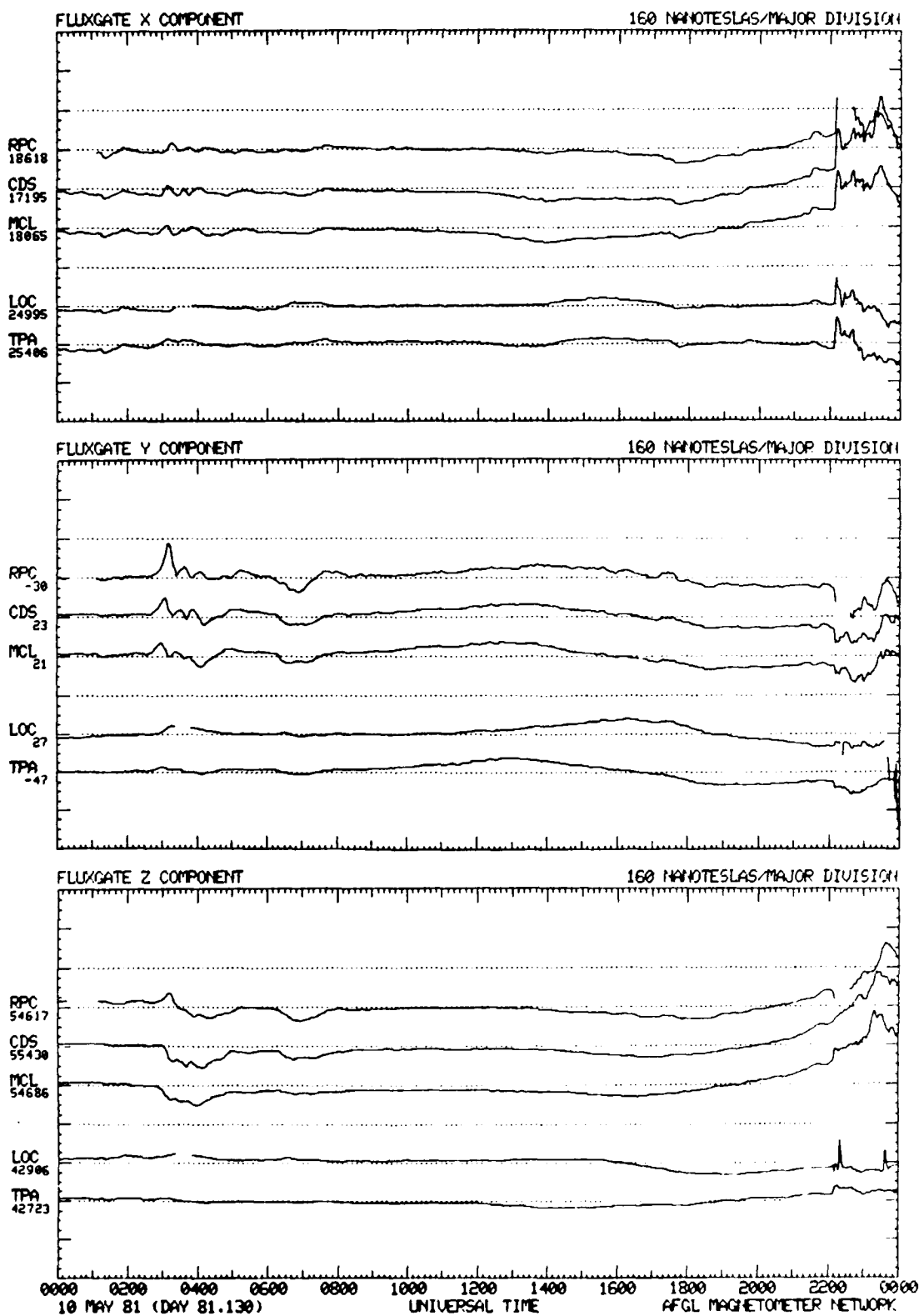


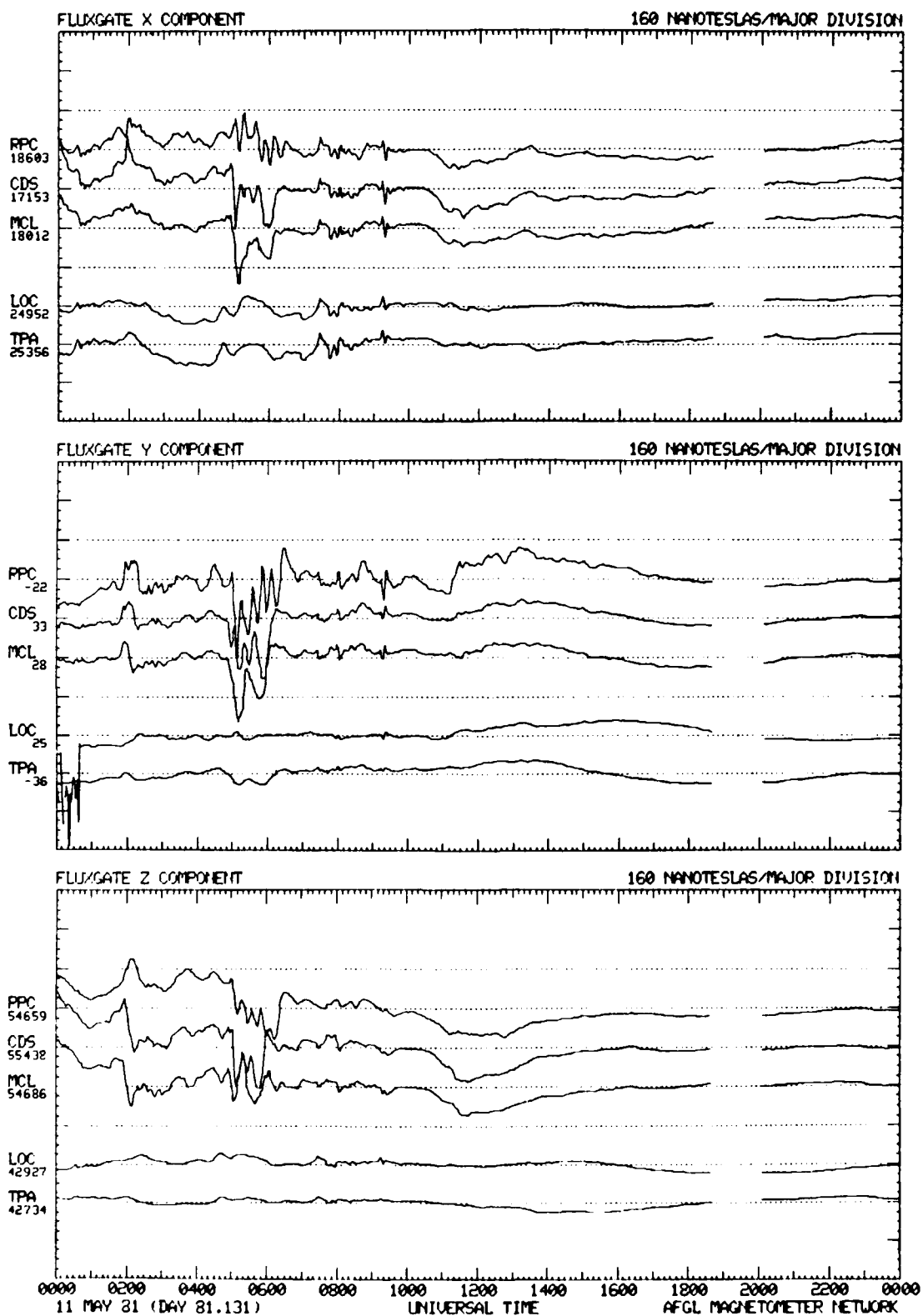


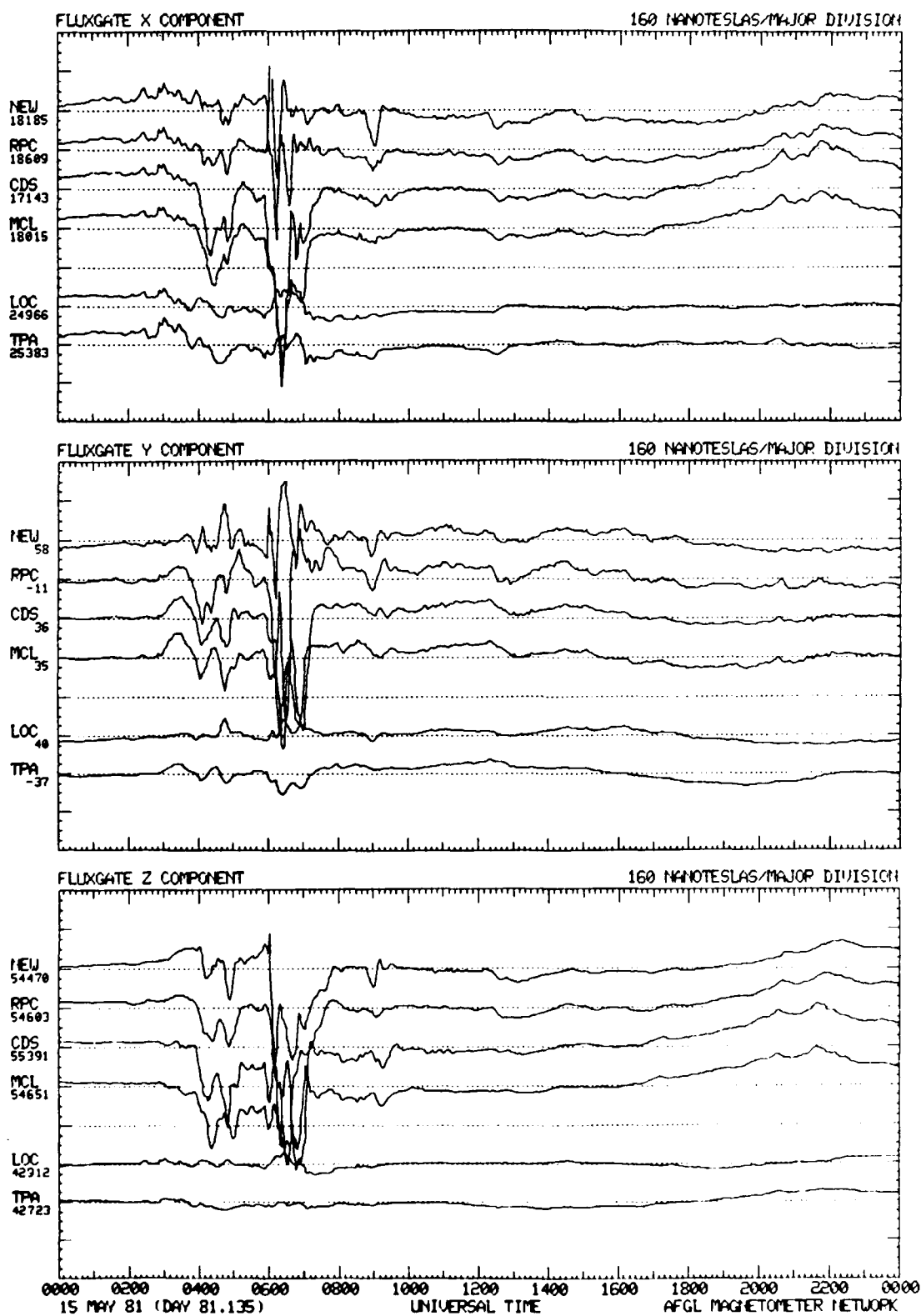


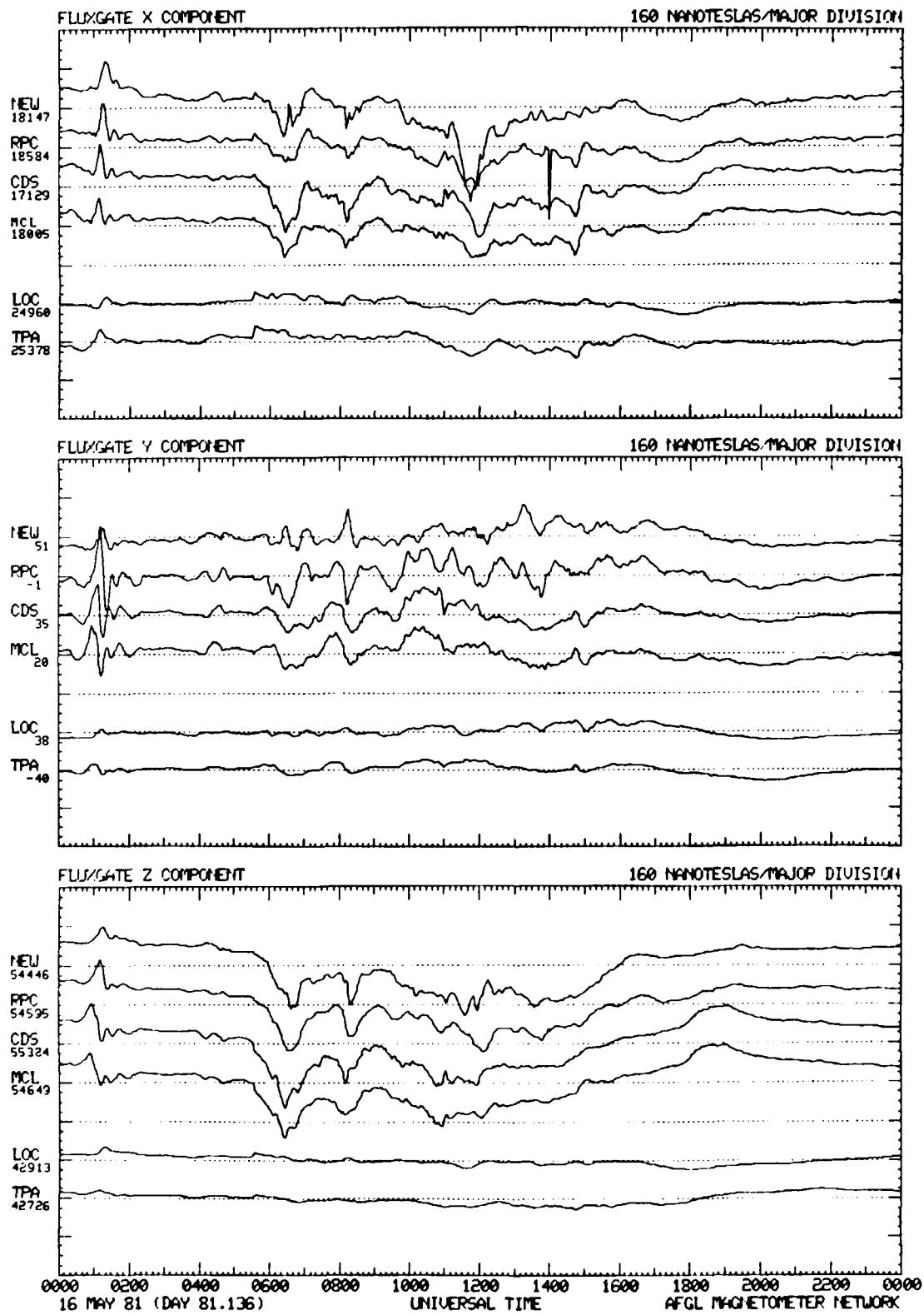


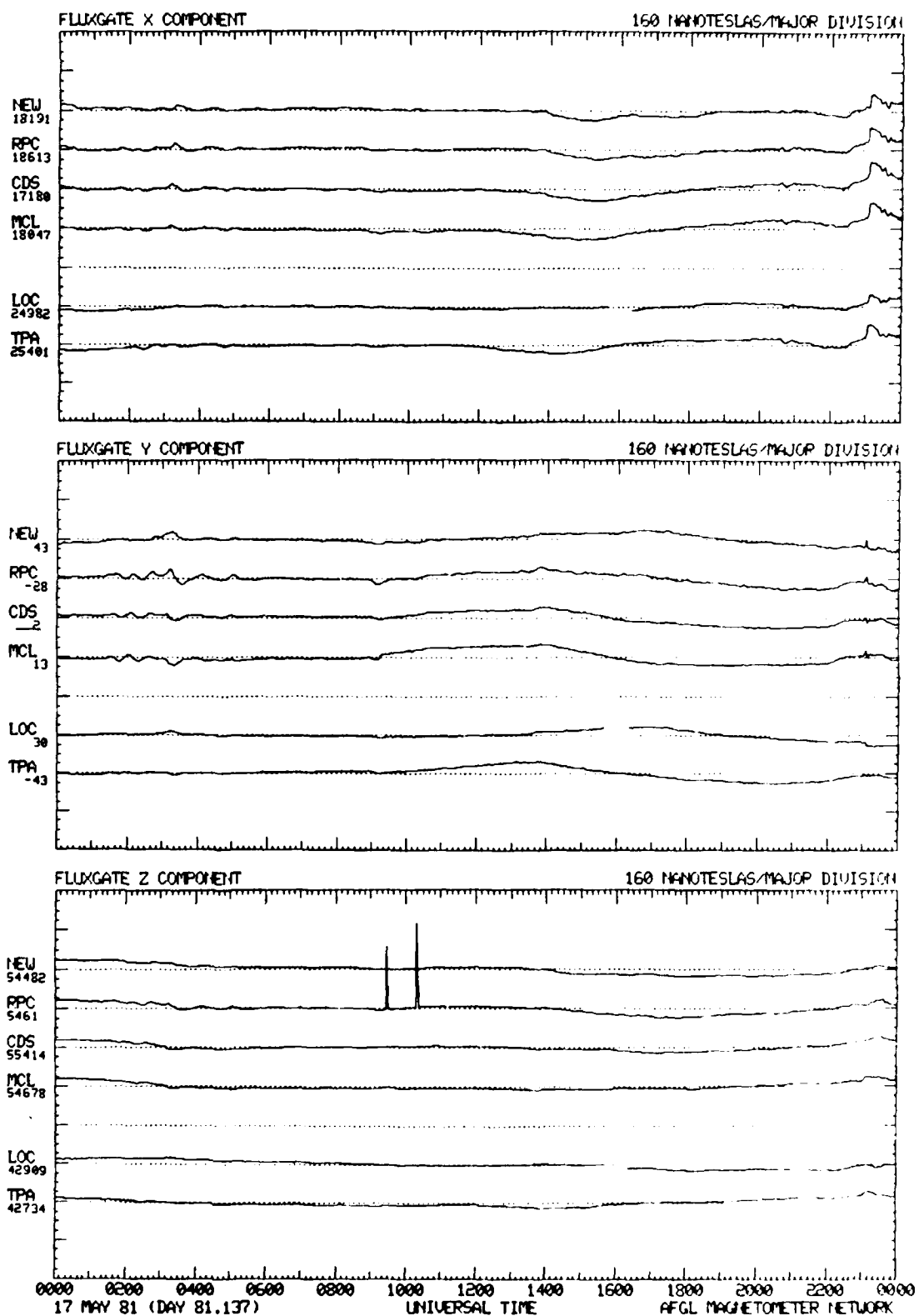




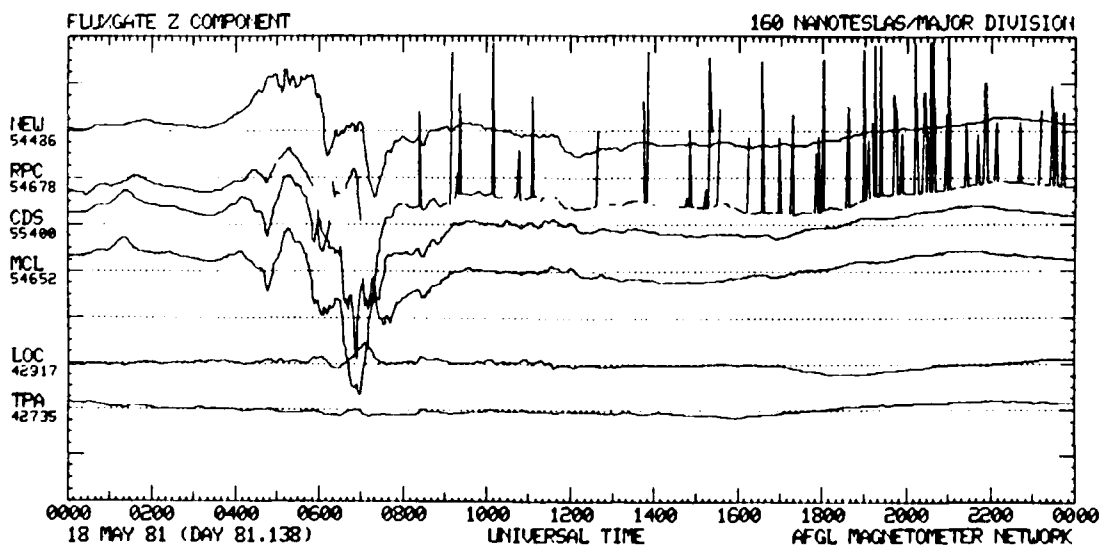
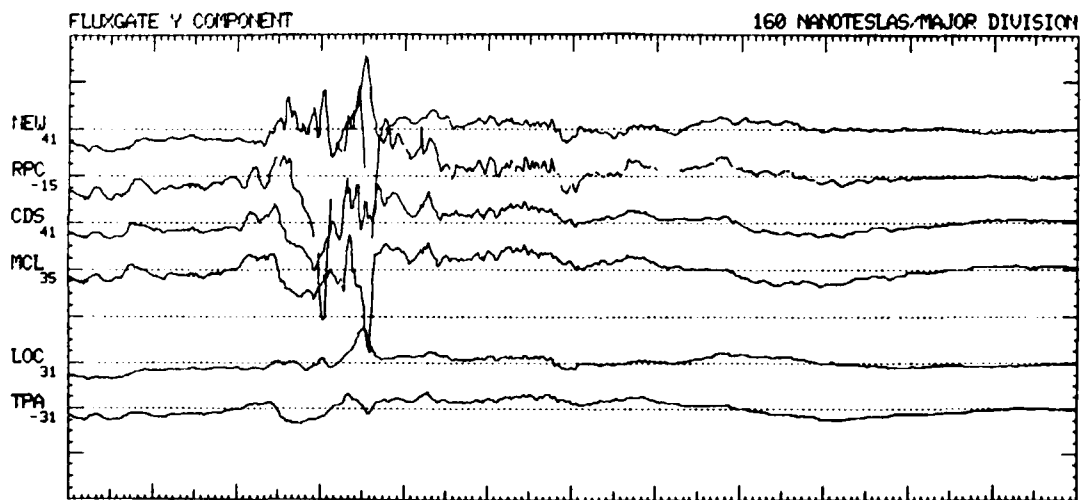
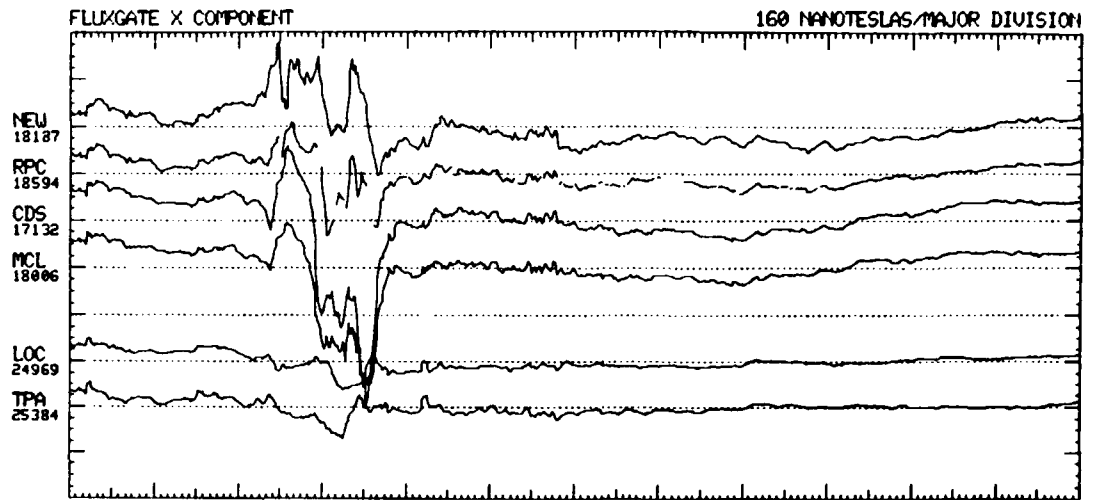








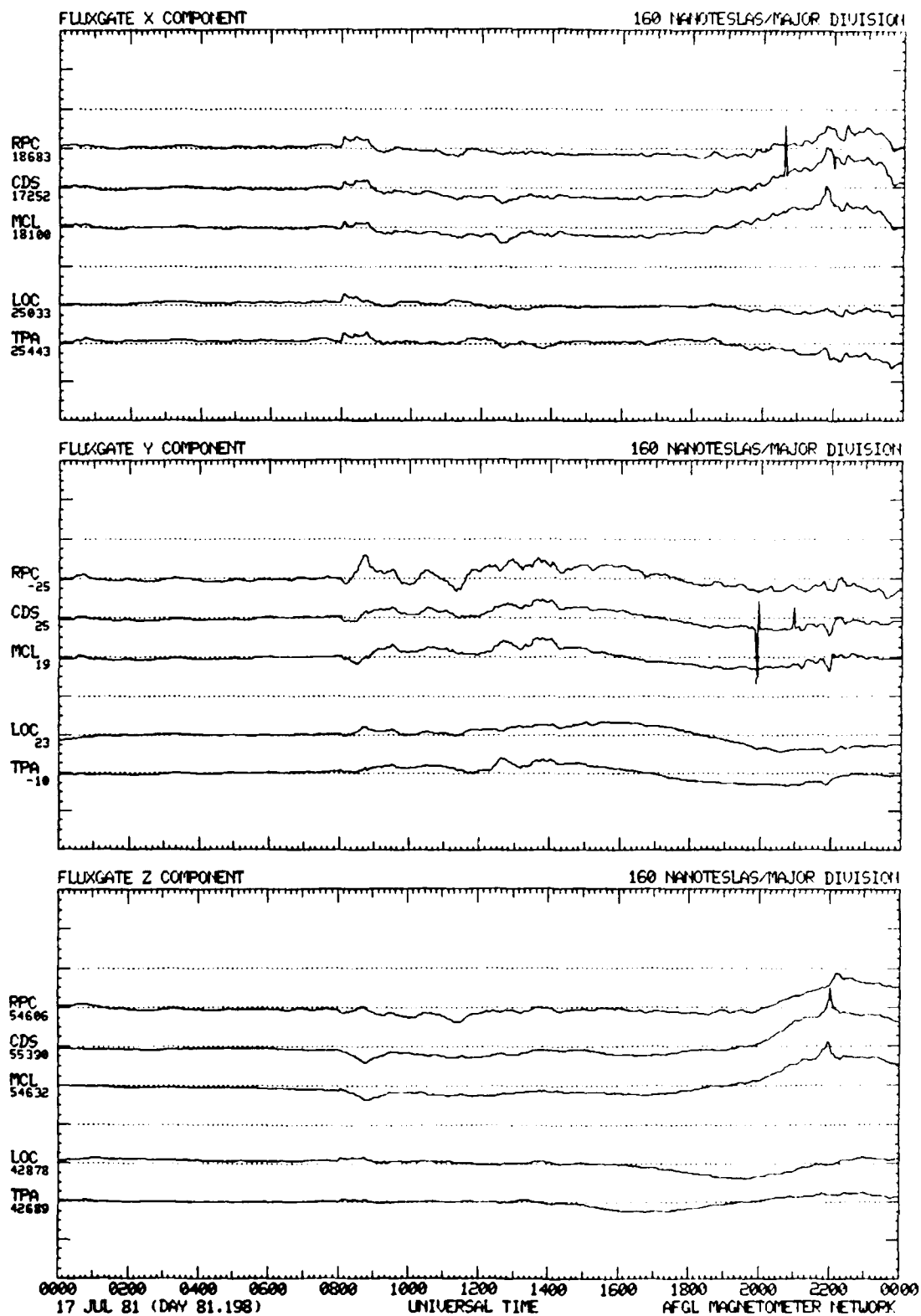


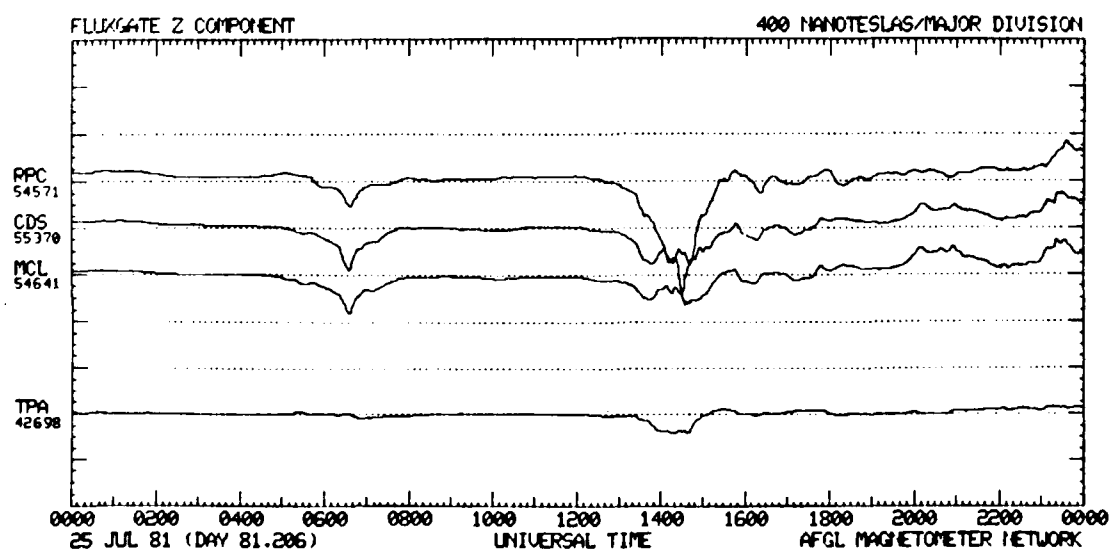
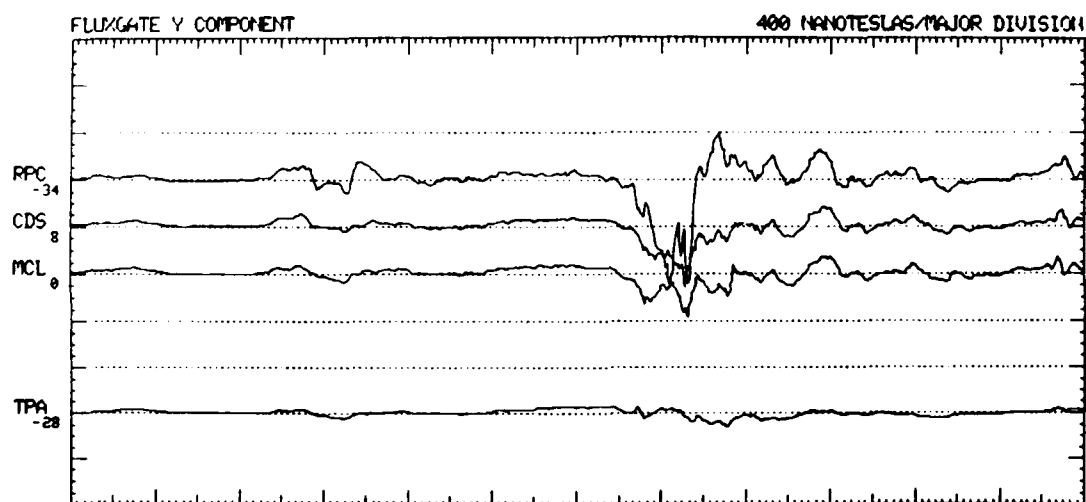
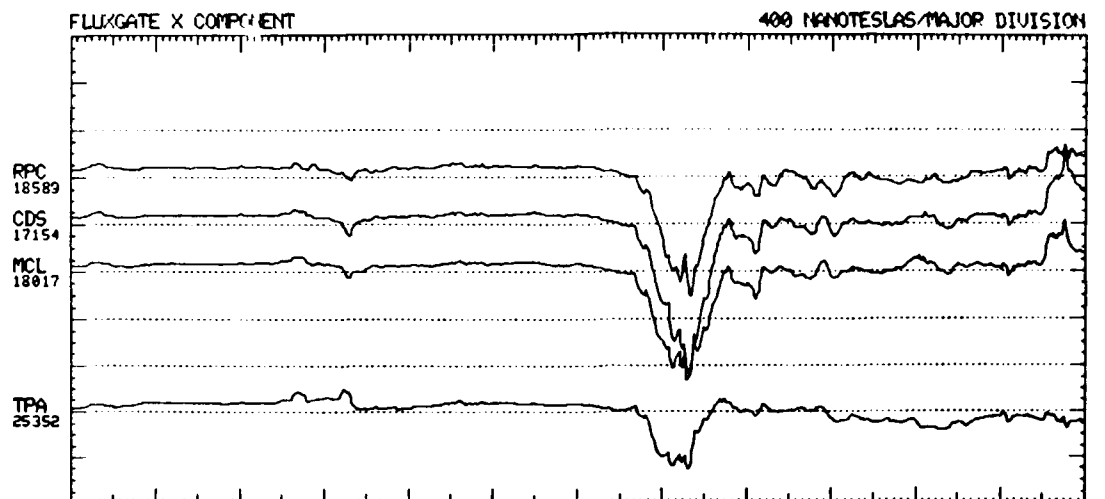


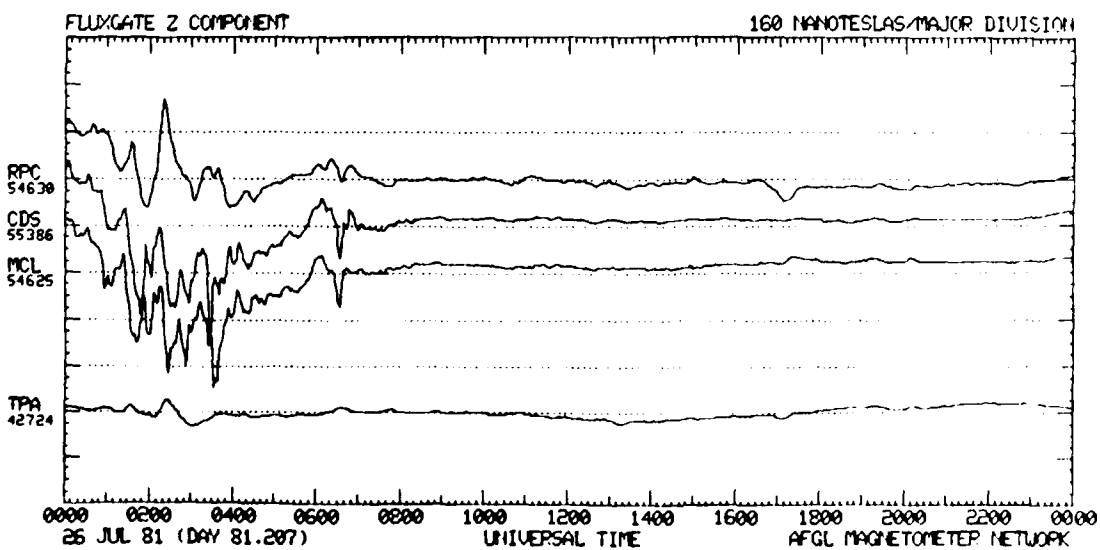
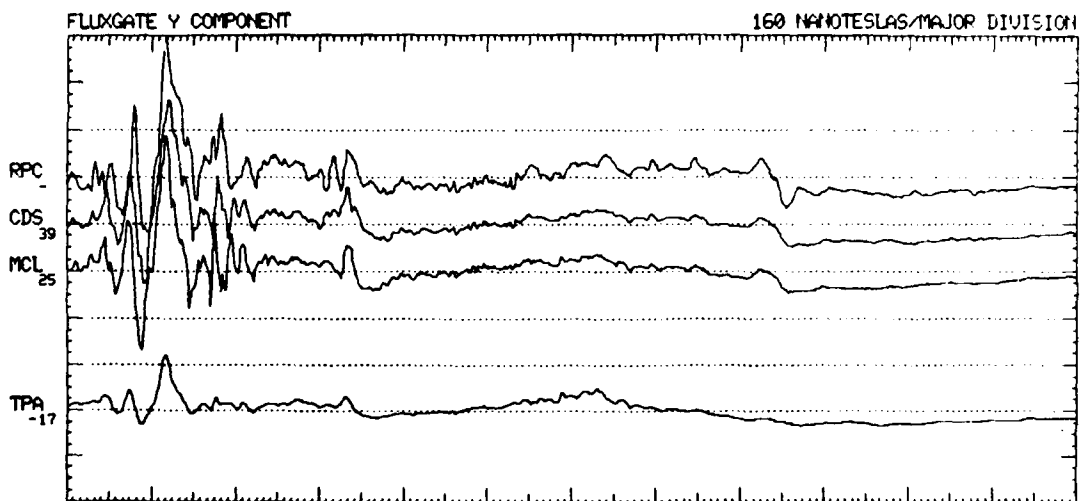
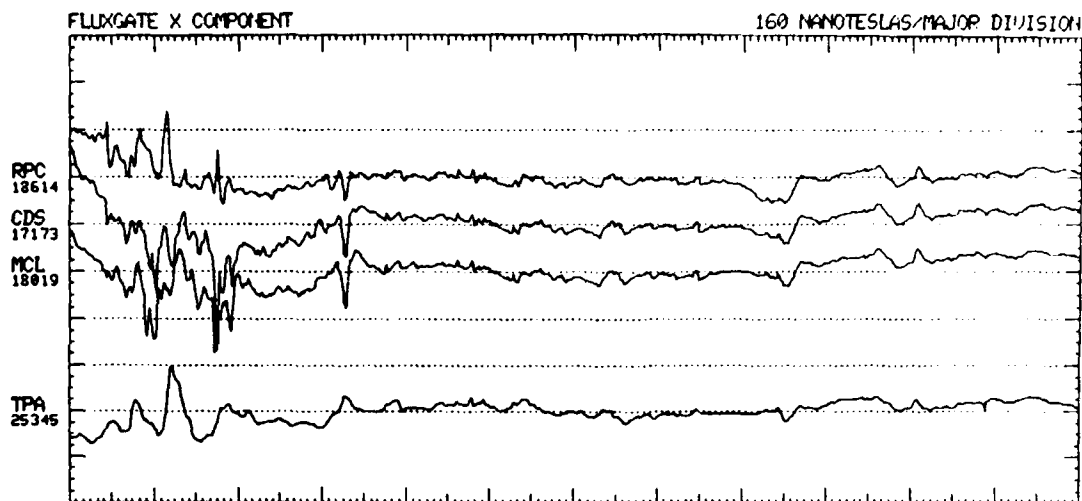
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18 MAY 81 (DAY 81.138)

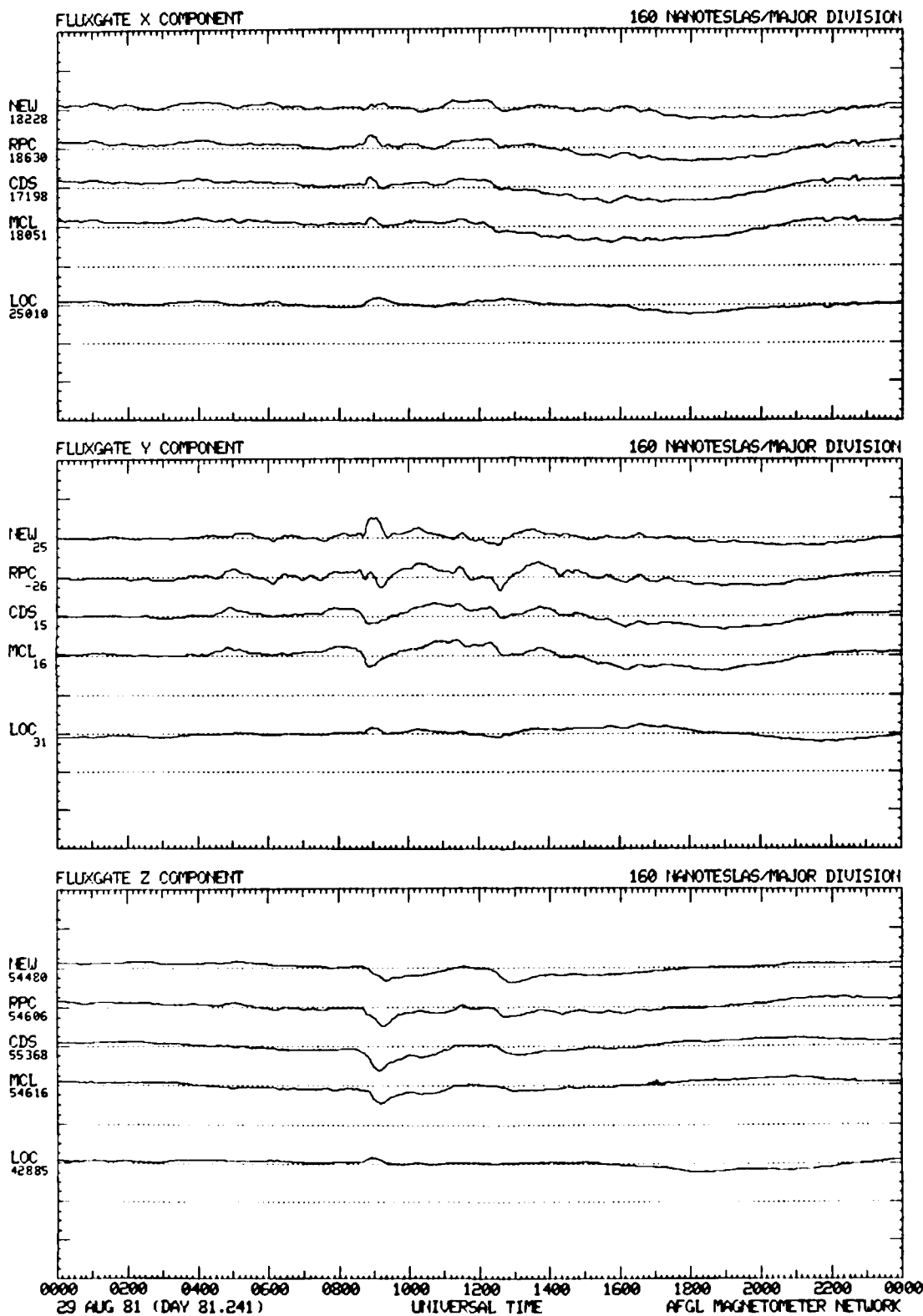
UNIVERSAL TIME

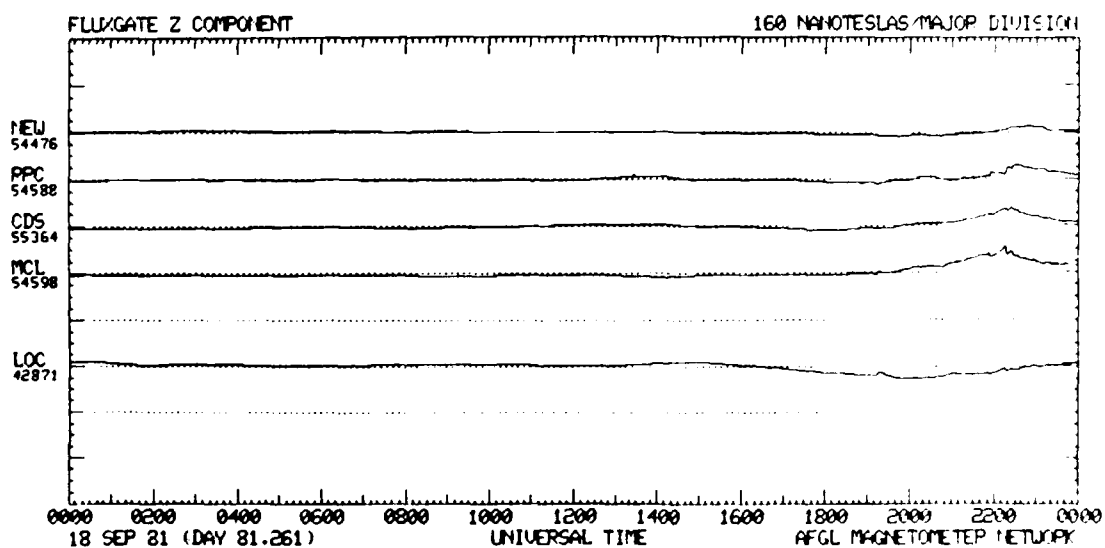
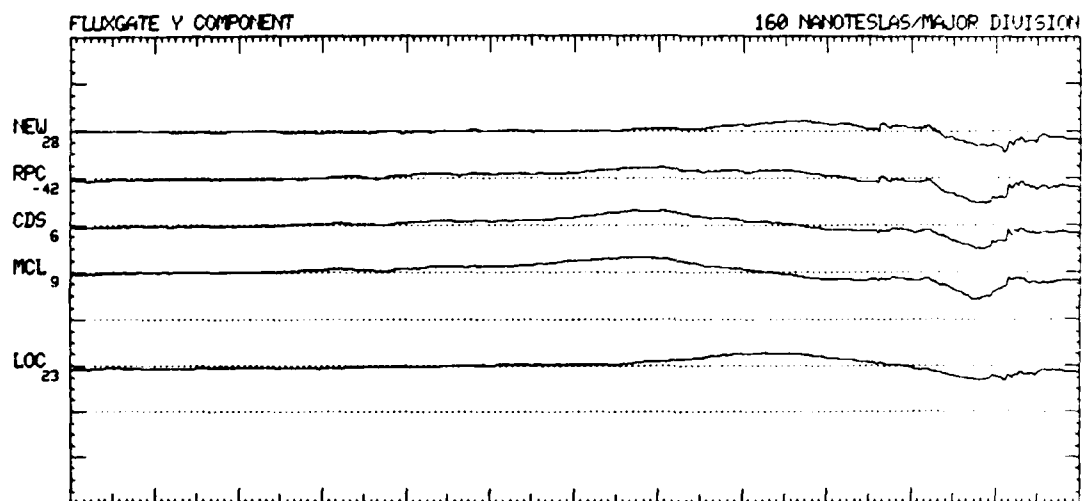
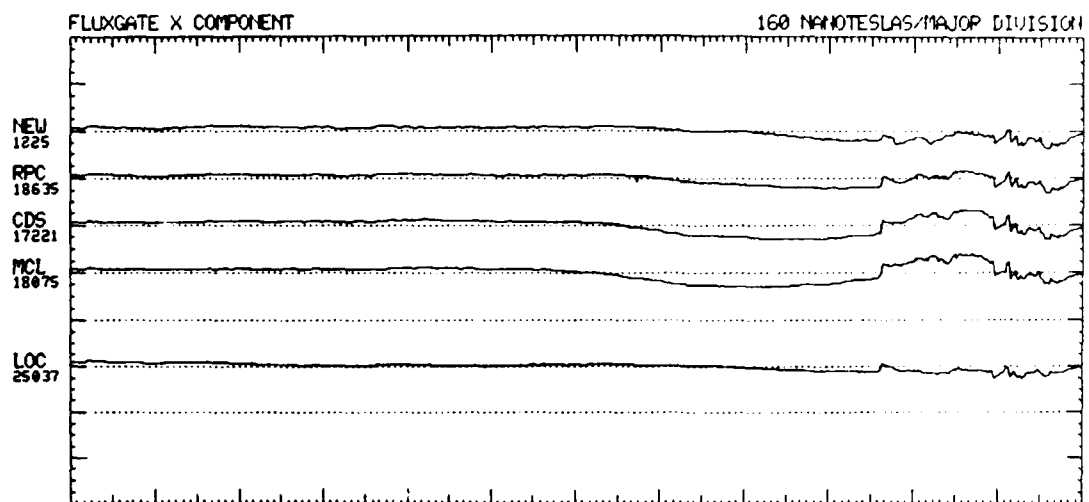
AFGL MAGNETOMETER NETWORK

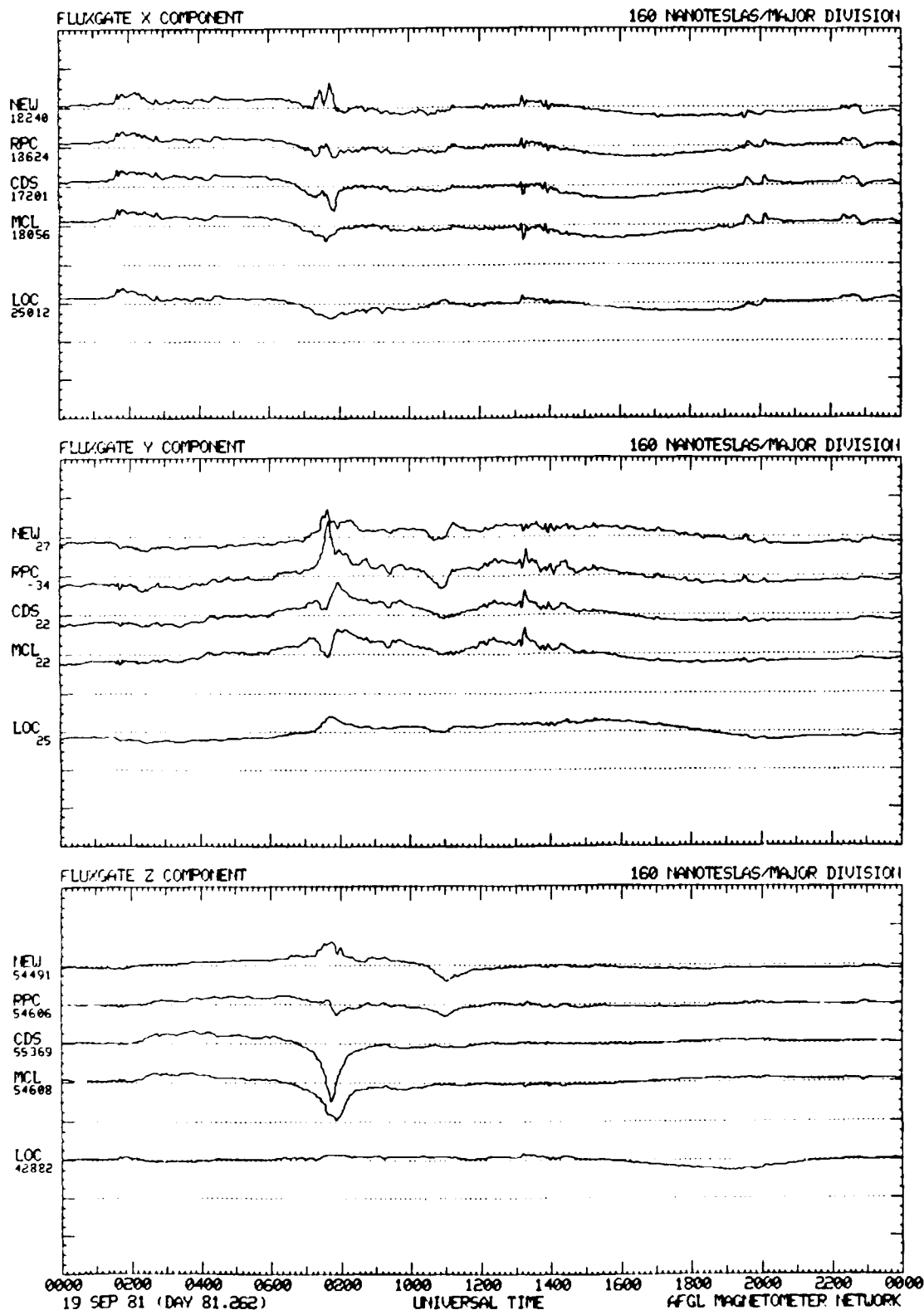


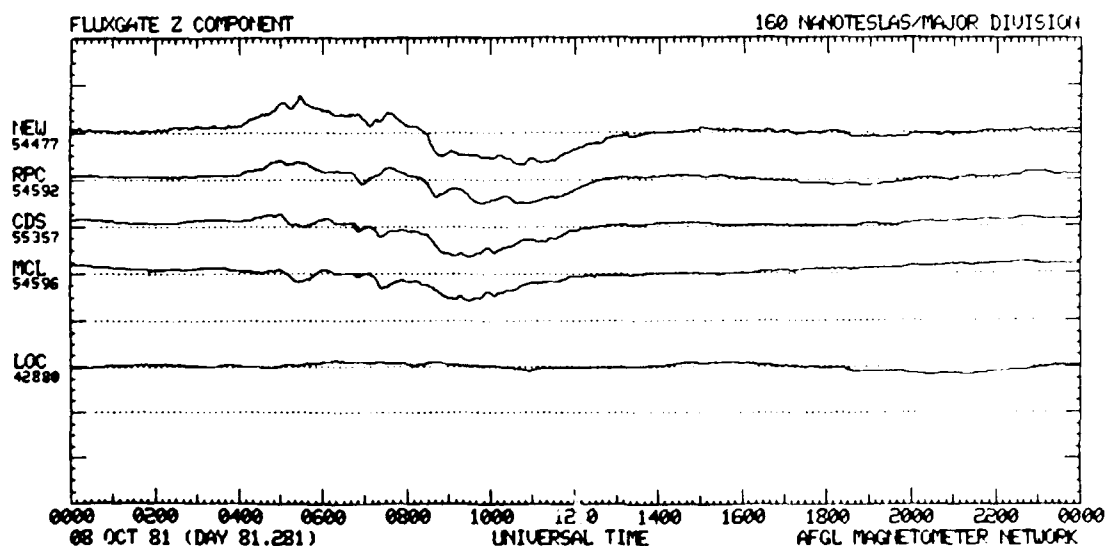
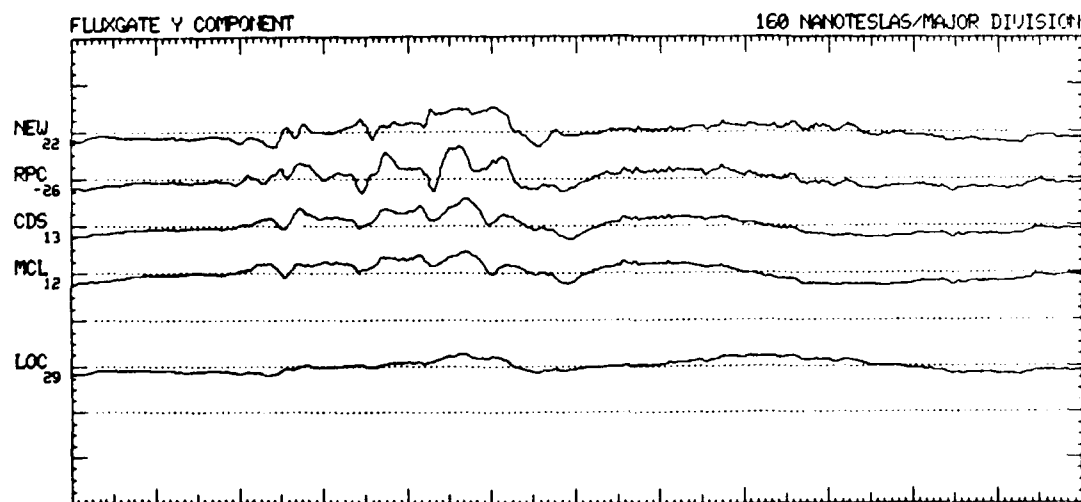
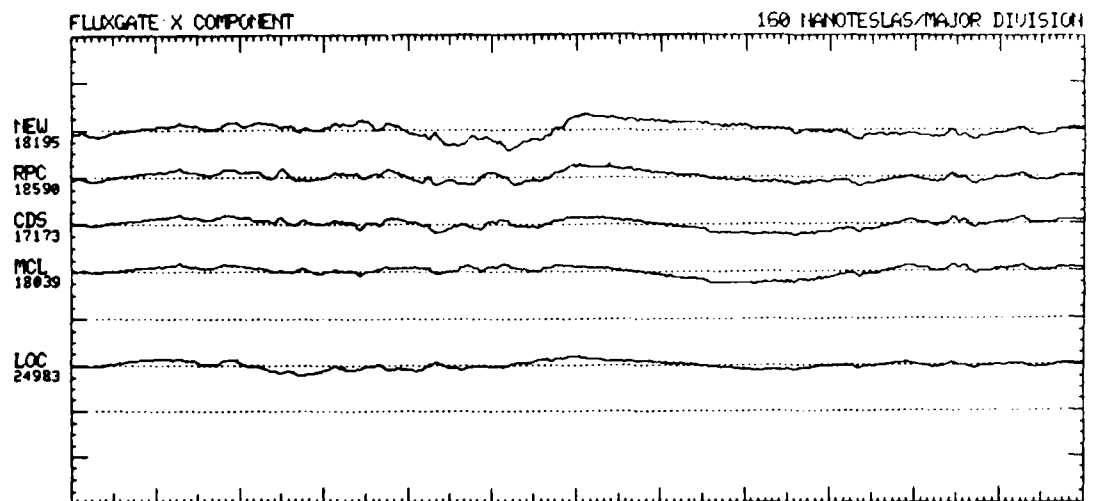






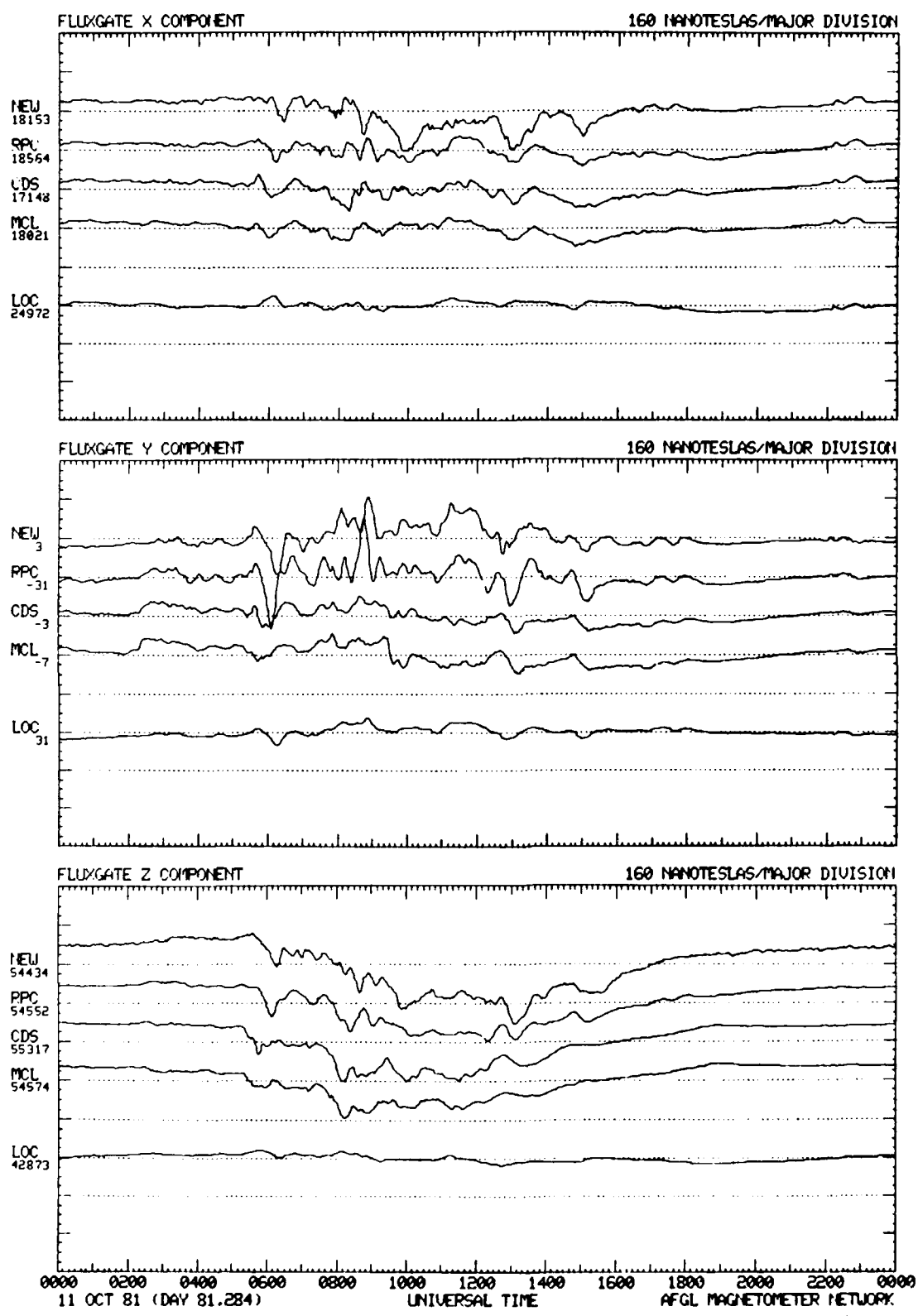


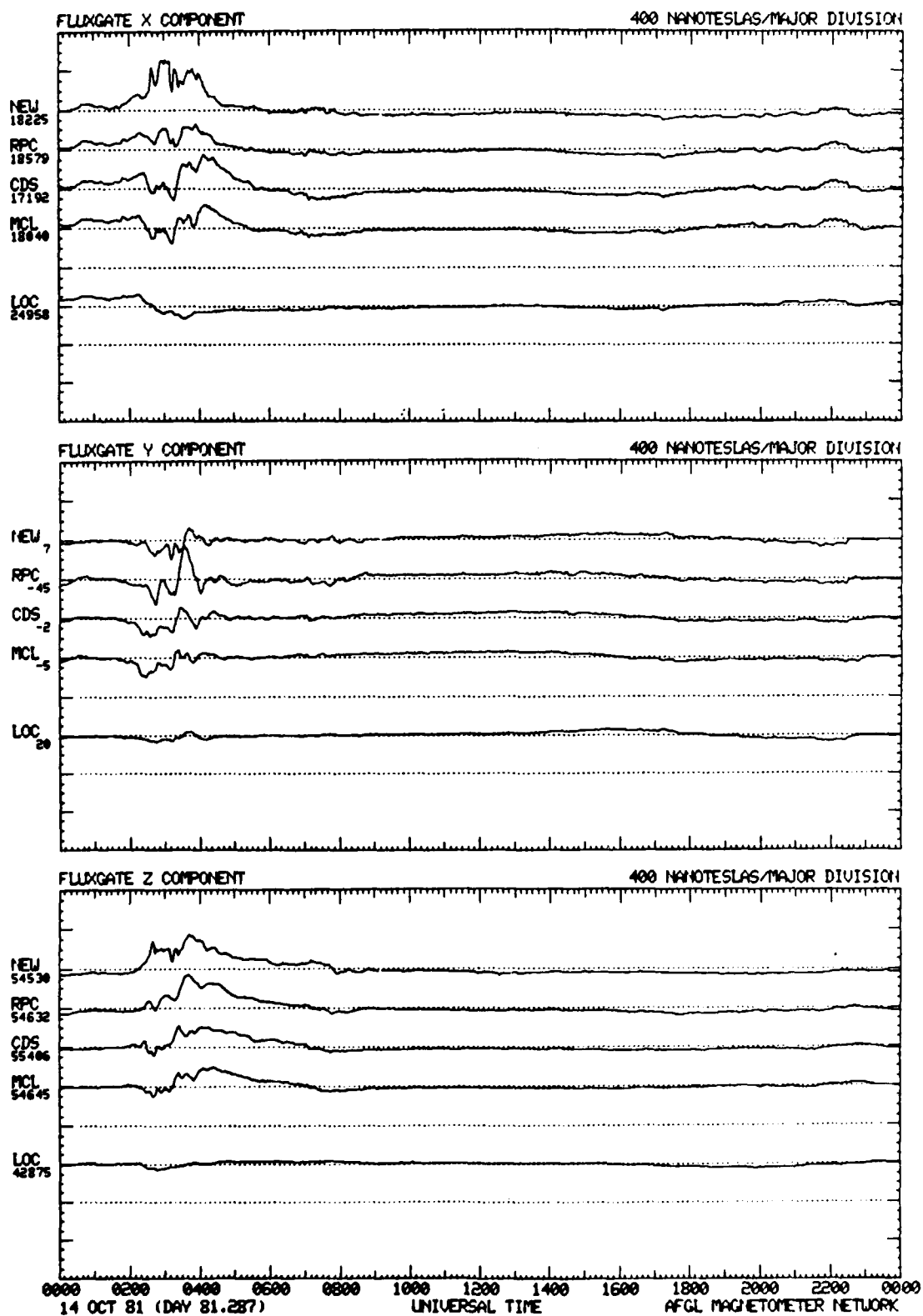


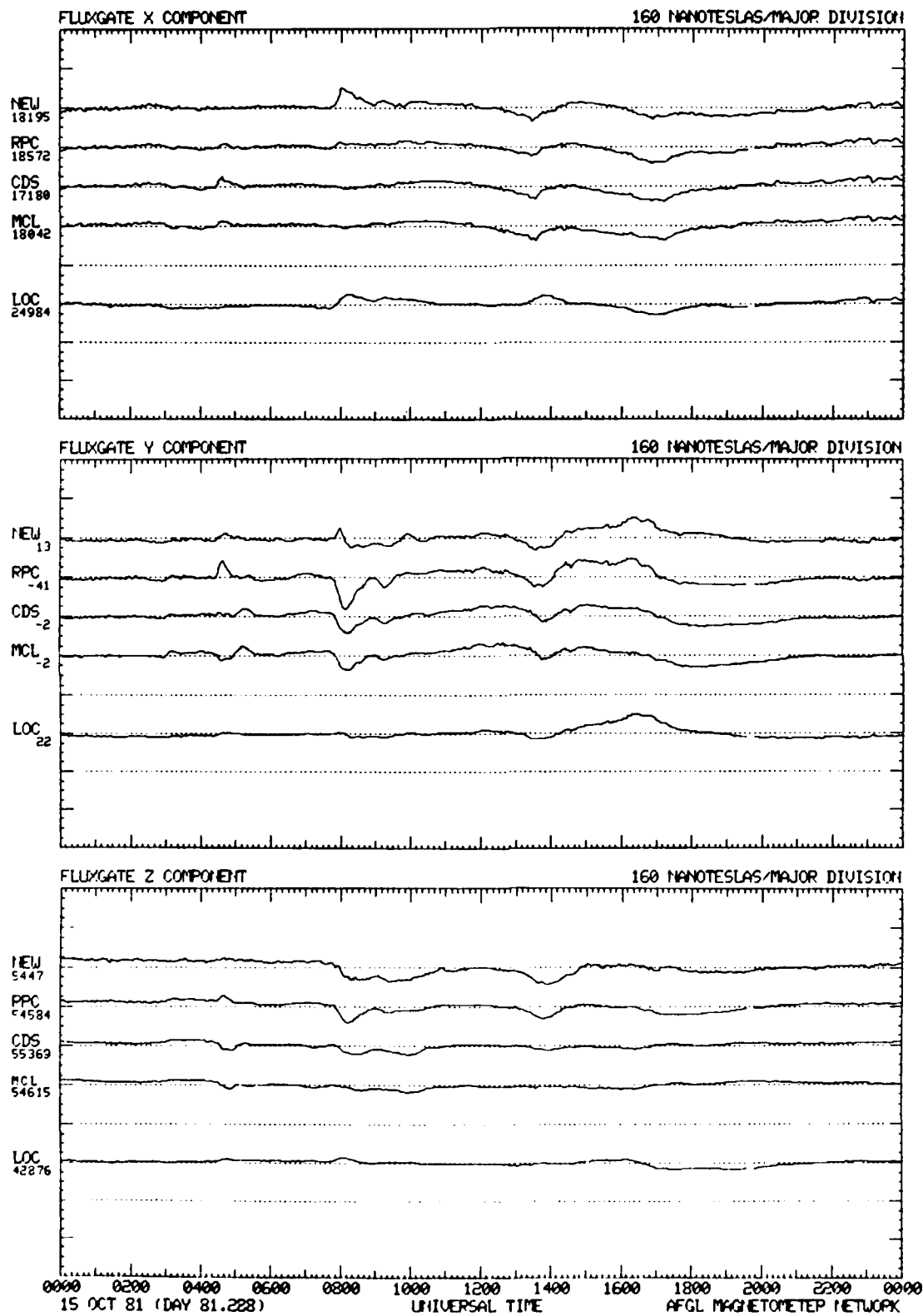


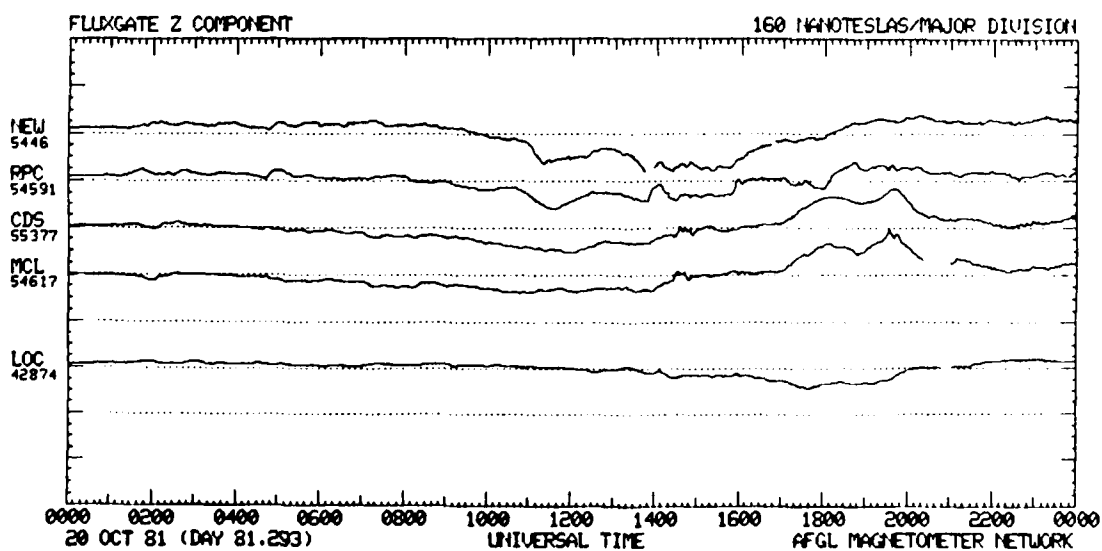
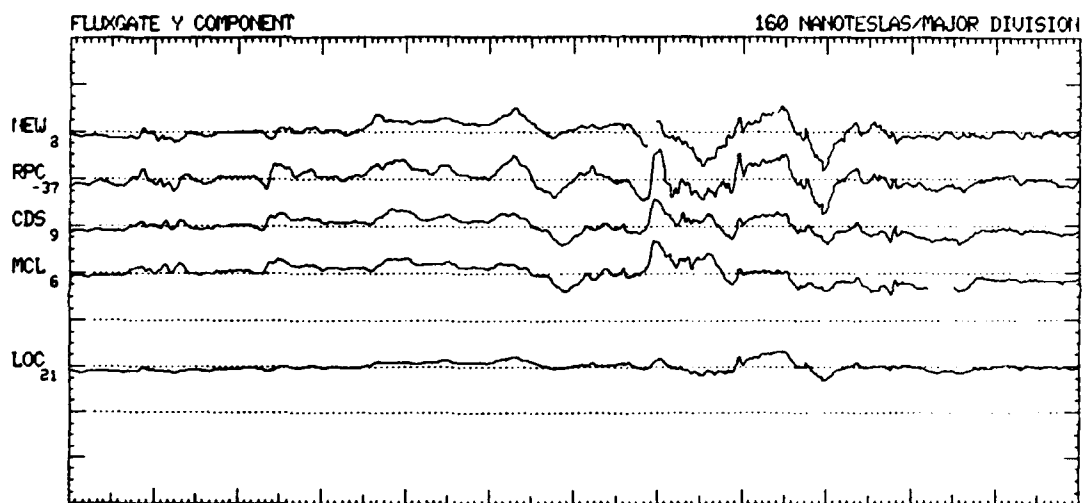
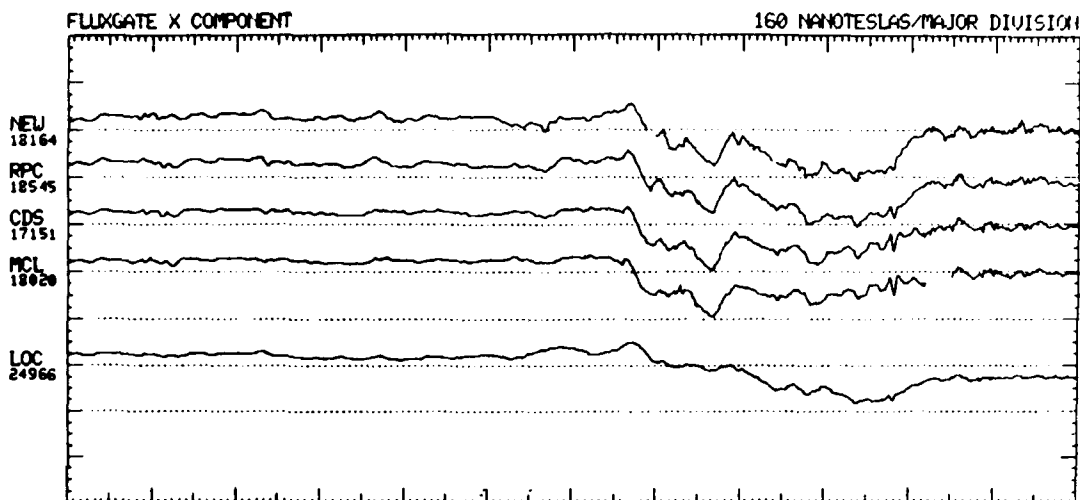
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08 OCT 81 (DAY 81.281) UNIVERSAL TIME AFGL MAGNETOMETER NETWORK

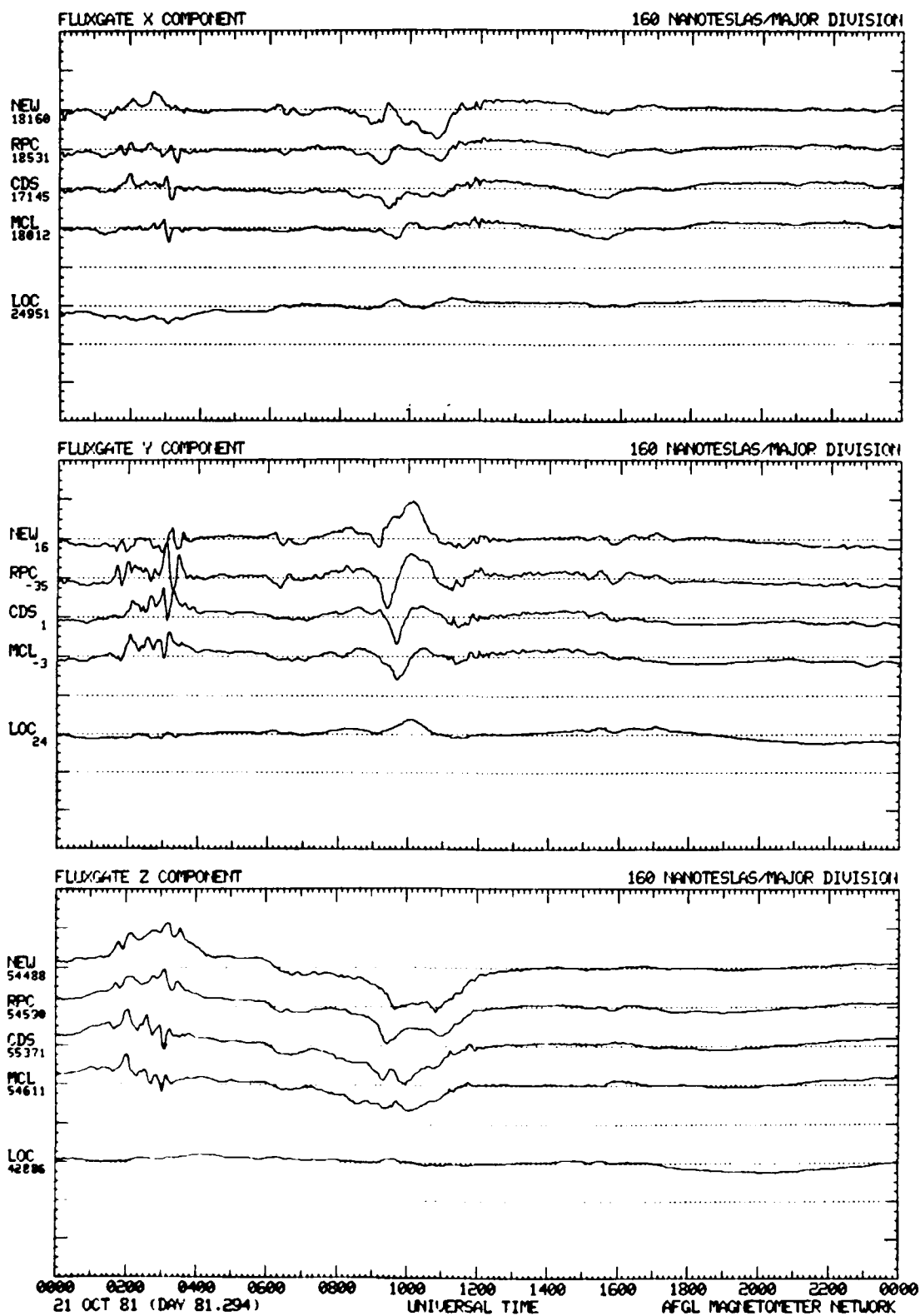


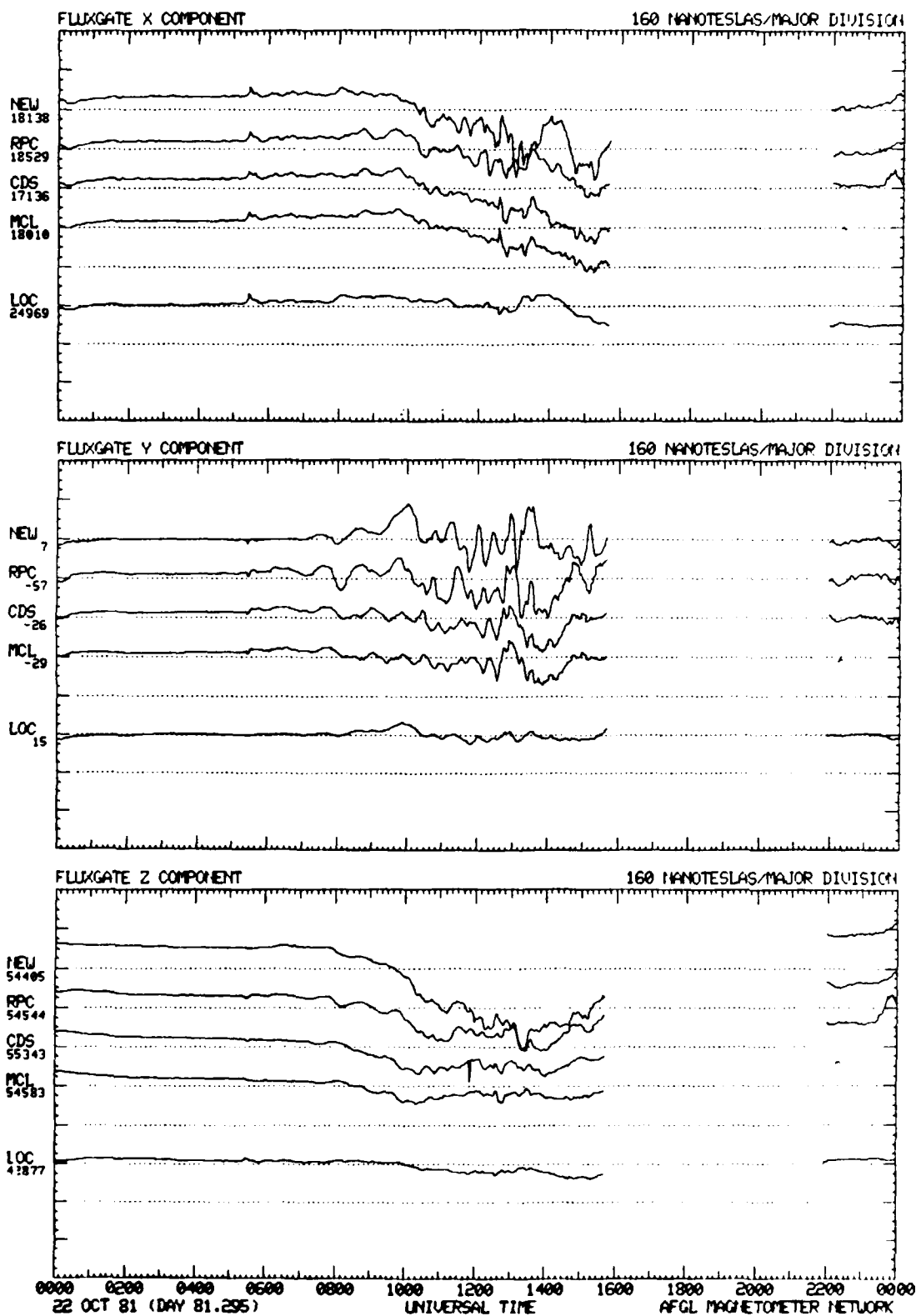


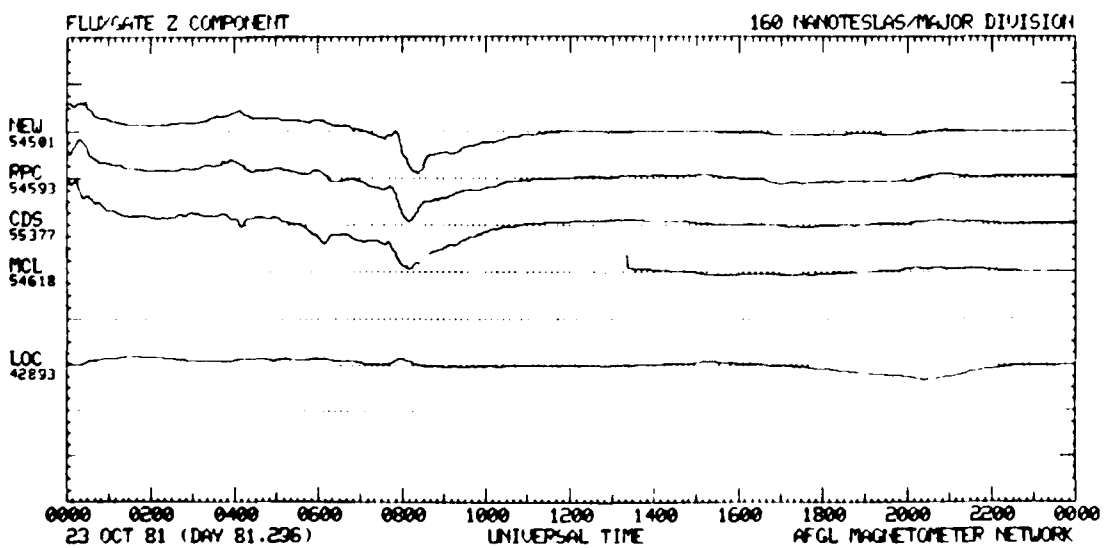
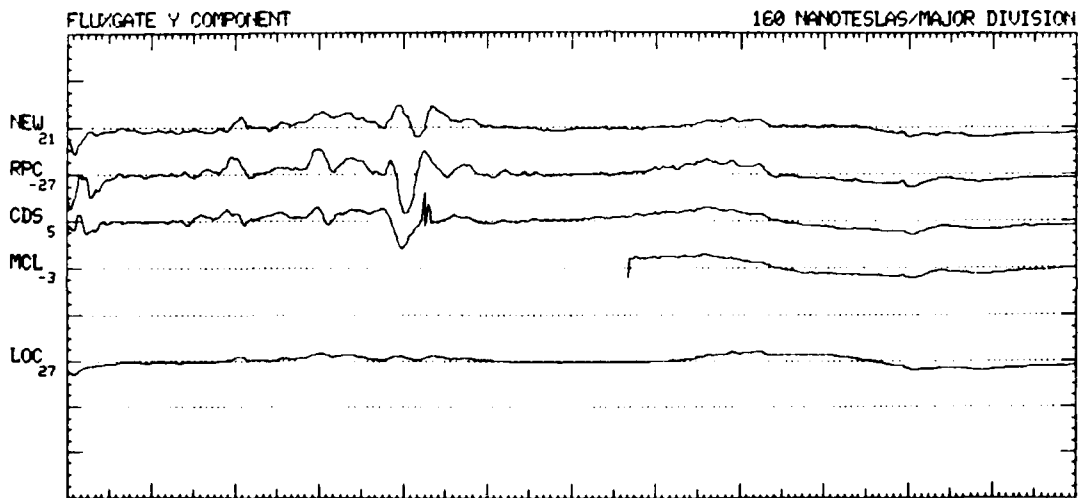
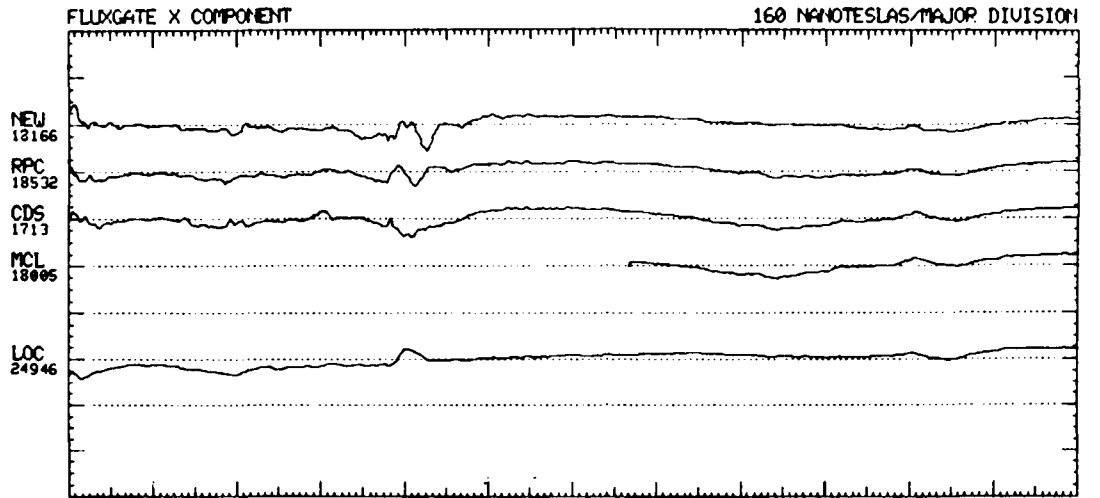








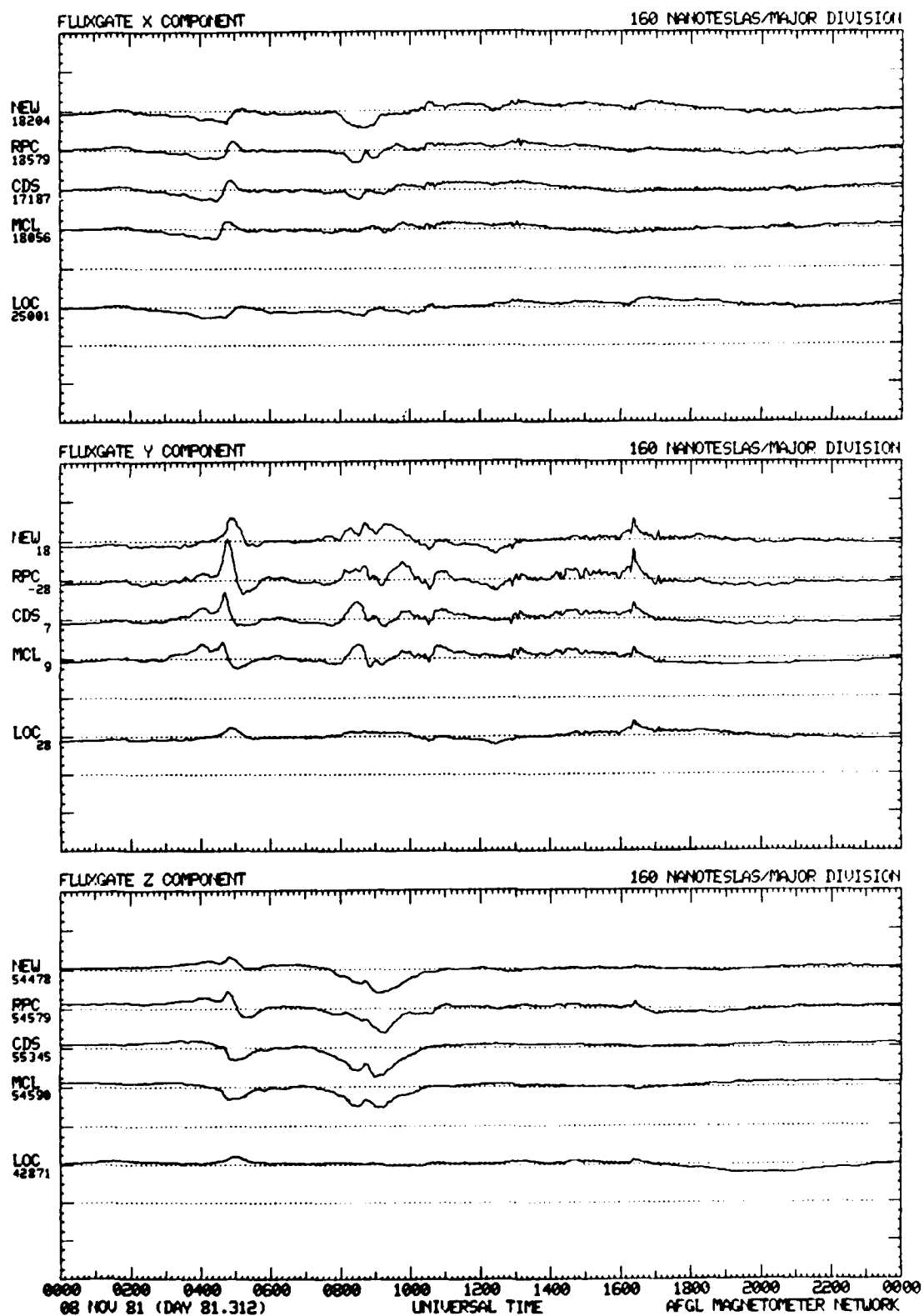




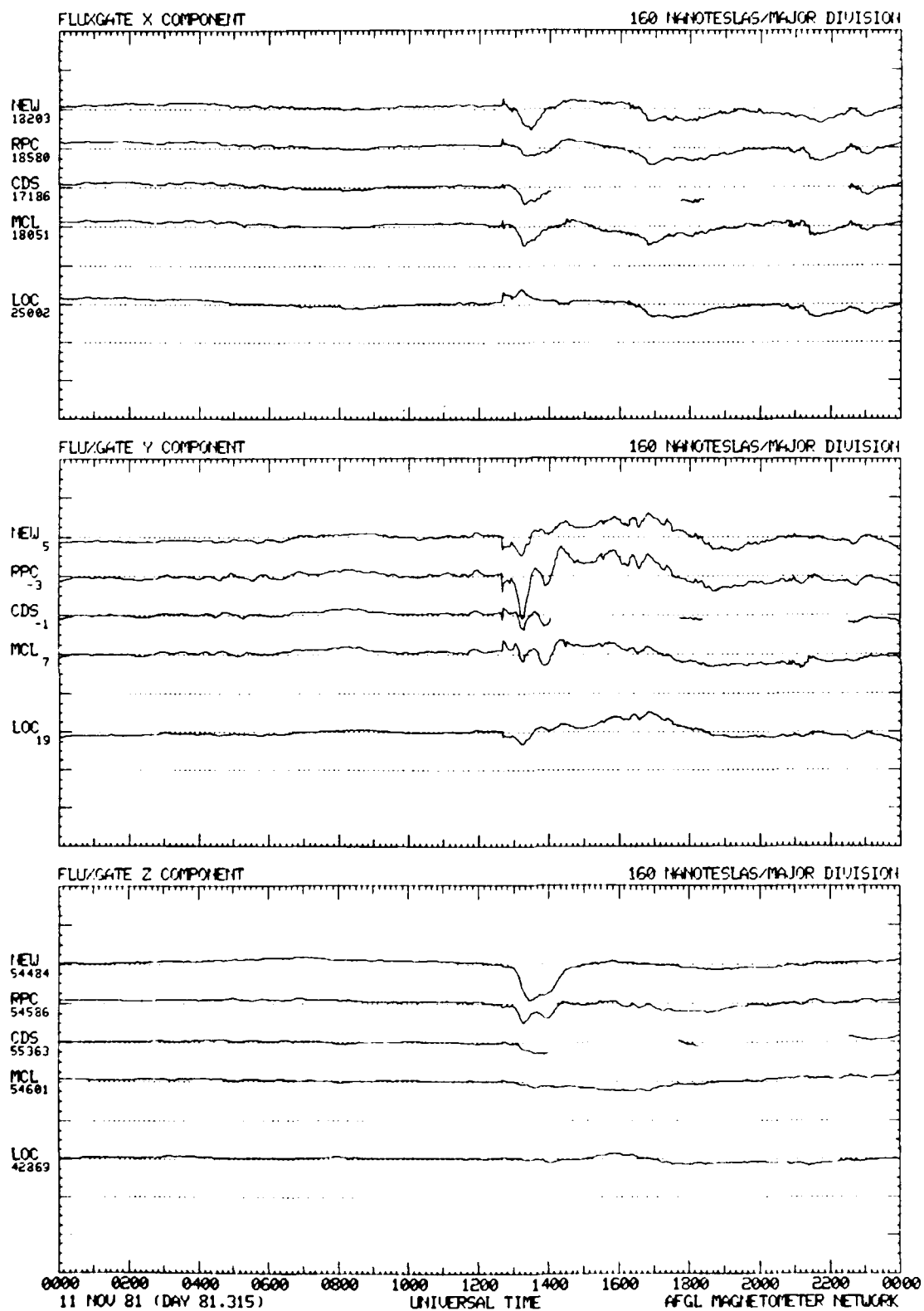
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23 OCT 81 (DAY 81.236)

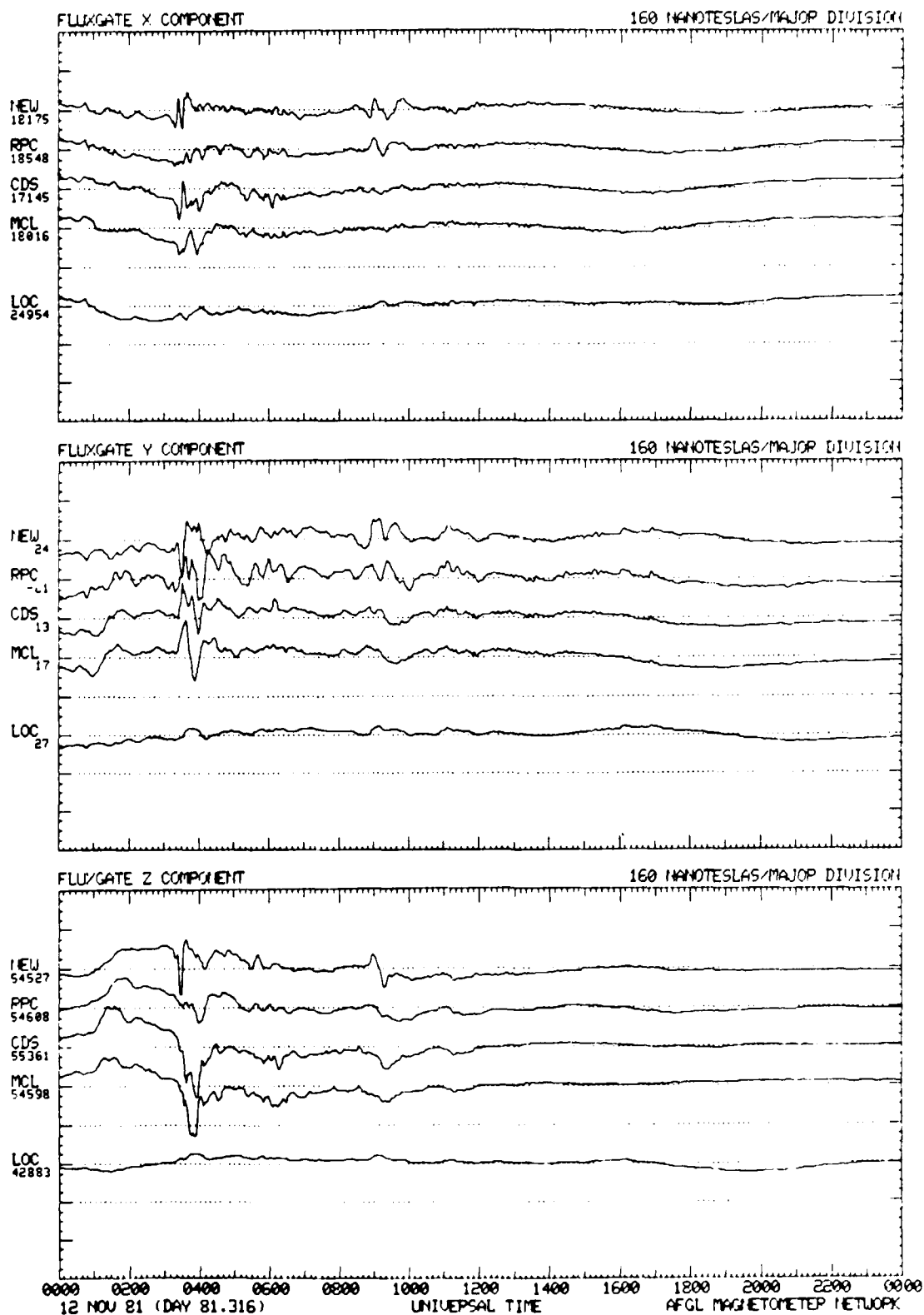
UNIVERSAL TIME

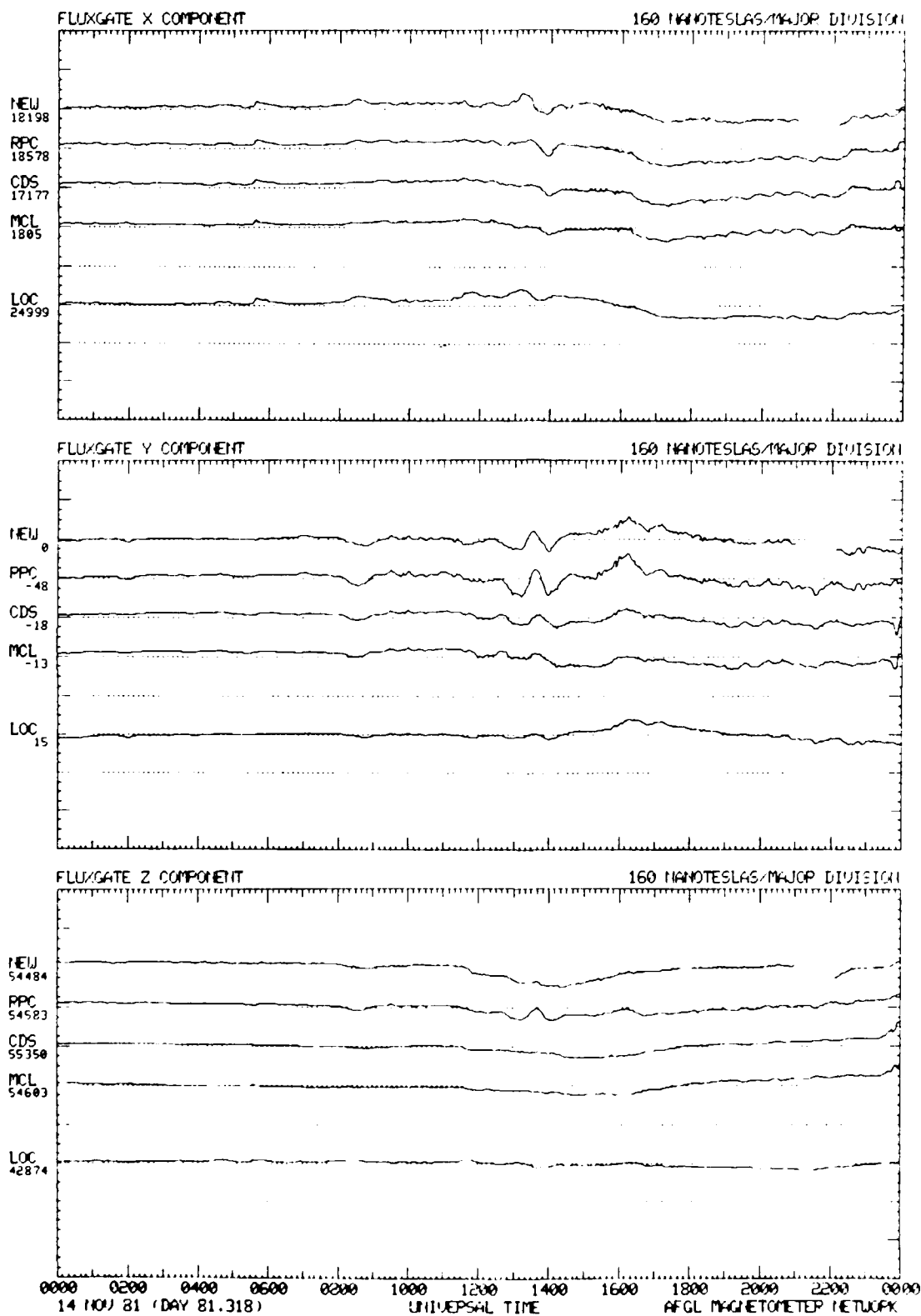
AFGL MAGNETOMETER NETWORK











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